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EFFECT OF DRIED COW MANURE ON GROWING PULLETS[1]

M. M. ROSENBERG and A. L. PALAFOX

Department of Poultry Husbandry, College of Agriculture
University of Hawaii, Honolulu, Hawaii

The value of dried cow manure as a source of vitamins for chickens is well known. Despite widespread interest in its use as a supplementary feed, there is meager information regarding its value in grower rations with specific reference to growth rate and age at sexual maturity of pullets. Hammond (1942) has reported that dried cow manure stimulated growth of chicks fed a diet deficient in riboflavin, but no beneficial effect was observed among chicks fed an enriched ration. Turner (1947) concluded that 20 percent dried cow manure was not injurious to growth rate of pullets, although growth of cockerels was definitely depressed at that concentration. He suggested that the androgenic hormone in cow manure was partially responsible for the increased growth rate of the pullets. Turner also reported that the inclusion of 5 and 10 percent of cow manure in the ration slightly hastened the onset of egg production. Production of the group fed 20 percent cow manure was retarded, however. Whitson *et al.* (1946) have reported that egg production of Rhode Island Red pullets was significantly depressed when they were fed a ration containing 8 percent dried manure of high androgenic potency. Palafox and Rosenberg (1951), however, obtained data which suggested that laying pullets were not adversely affected by 15 percent air-dried cow manure when the diet was supplemented with sufficient herring meal to provide crude protein equivalent to that of the control ration.

In areas where feed shortages and uncertain supply may result from shipping strikes, and/or ingredients are costly, it would be worth while to know the extent to which grower rations can be conserved through cow manure supplementation.

MATERIALS AND METHODS

Sixty 7-week-old New Hampshire pullets, previously vaccinated with fowl pox and formalin-inactivated Newcastle disease vaccines, were weighed and randomized into four lots. These were housed in adjacent 9′ x 10′ open-air, all-wire de-

[1] Published with the approval of the Director of the Hawaii Agricultural Experiment Station as Technical Paper No. 238.

veloper pens, and the rations shown in Table 1 were fed throughout this study. At 18 weeks of age the pullets were revaccinated against Newcastle disease with killed virus and transferred to open-air, all-wire laying pens. They were then given oyster shell *ad libitum*. Data on body weight and feed consumption were collected biweekly from 7 to 25 weeks of age, and egg production was recorded daily. All eggs were weighed and candled for the presence of double yolks, body check or cracked eggs, and meat and blood spots. Daily inspections for soft-shelled eggs were made beneath the pens and in the trapnests.

As may be seen in Table 1, the experimental rations differed in the concentrations of oven-dried cow manure and herring meal. Additional herring meal was supplied to rations 2, 3, and 4 to maintain approximately the same protein level. Furthermore, the manure from lactating cows was collected urine-free and dried in an electric oven at not higher than 158°F.

TABLE I

Composition of Diets Containing Different Levels of Oven-Dried Cow Manure

Ingredient	Lots			
	1	2	3	4
	(pounds)	(pounds)	(pounds)	(pounds)
Whole wheat	10.0			
Ground wheat	17.5			
Cracked yellow corn	20.0			
Ground yellow corn	21.0			
Ground barley	9.0			
Herring meal	4.2			
Soybean oil meal	12.5			
Dehydrated alfalfa	4.2			
Ground oyster shell	5.0			
Deflourophos*	.6			
Salt	.5			
Manganese sulfate, gm.	5.0			
Delsterol, gm.†	10.0			
Fortafeed (2-22), gm.‡	30.0			
Grower ration	100.00	94.4	88.7	83.0
Oven-dried cow manure	0.0	5.0	10.0	15.0
Herring meal	0.0	.6	1.3	2.0
Chemical analysis:				
Protein	17.51	16.49	17.17	16.58
Calcium	.78	.75	.78	.58
Phosphorus	.56	.48	.55	.53

* A trade name: deflourinated rock phosphate.

† D-activated animal sterol containing a minimum potency of 2000 AOAC/gram.

‡ A trade name: containing not less than 4,400 mcg. each of riboflavin, calcium pantothenate, and nicotinic acid per gram of material.

To facilitate reporting the results of this study, data will, in all instances, be reported in the following sequence: lot 1, control lot 2, 5 percent oven-dried cow manure; lot 3, 10 percent oven-dried cow manure; and lot 4, 15 percent oven-dried cow manure.

RESULTS

There was no significant difference between the average body weights of lots 1, 2, 3, and 4. At 25 weeks of age these lots averaged 5.64, 5.44, 5.42, and 5.29 pounds, respectively. The maximum difference, between lots 1 and 4, was 0.35 pound, and this value did not exceed the least significant difference (0.69 pound). The biweekly body weights are shown in Figure 1. To 23 weeks of age, the lots fed 5 and 10 percent oven-dried cow manure grew as rapidly as the controls, whereas those fed 15 percent grew uniformly more slowly throughout this study.

The average total feed consumption during the 18-week test period was 31.45, 30.17, 30.61, and 30.30 pounds, respectively, for lots 1, 2, 3, and 4. Moreover, feed efficiency (pounds of feed required to support a pound of gain) was 7.75, 7.85, 8.12, and 8.10. The differences among lots for feed consumption and efficiency were not statistically significant.

An effect of dried cow manure on egg production was noted during the first few weeks. The first egg per lot was observed at 130, 132, 133, and 142 days of age, respectively,

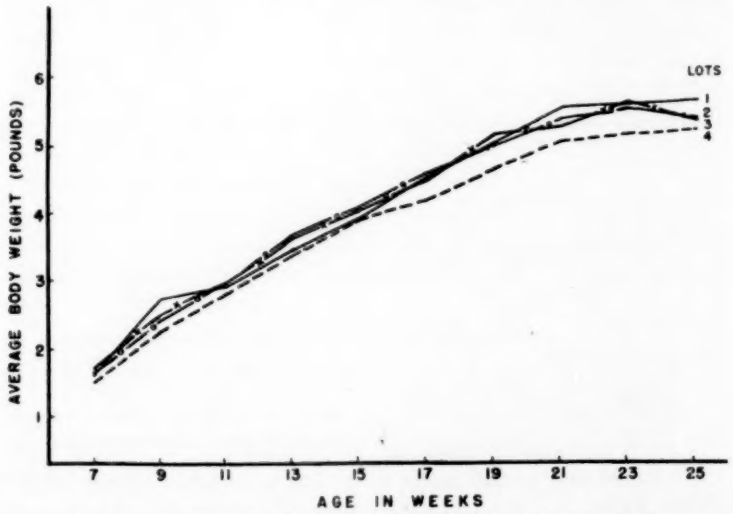

Fig. 1. Average biweekly body weights of lots fed three different concentrations of oven-dried cow manure.

for lots 1, 2, 3, and 4; and total hen-day egg production from 130 to 171 days of age was 43.6, 37.8, 35.4, and 34.4 percent. Whereas there was no significant difference in total hen-day production among the four lots, the difference between lots 1 and 4 closely approached significance. Evidently the depressing effect of the androgenic hormone in the different concentrations of cow manure was overcome by the experimental birds, because production during the last week of this study was 60.4, 58.9, 62.2, and 65.7 percent, respectively, in lots 1, 2, 3, and 4. In Figure 2 is shown the weekly egg production of the four lots.

The average weight of all eggs excluding soft-shelled, broken, and double-yolked eggs, by lots was 42.6, 44.6, 43.1, and 42.8 grams. Upon analysis, the average weekly egg weights shown in Figure 3 were found to be nonsignificant. Nor was there any real difference in the incidence of double-yolked eggs. Whereas the controls produced 9.0 percent, lots 2, 3, and 4 produced, respectively, 10.6, 5.4, and 3.6 percent double-yolked eggs. The incidence of these eggs may also be seen in Figure 2. There was, however, a significant difference in broken eggs, the incidence being 2.1, 4.0, 2.0, and 7.7 percent. The frequency of soft-shelled eggs, however, was negligible and not significantly different among the experimental groups.

DISCUSSION

The data procured in this study are in reasonable agreement with those presented by Turner (1947). No significant difference was derived among the body weights of the experimental groups. Pullets fed 5 and 10 percent oven-dried cow manure, supplemented with herring meal to ensure a minimum of 16.5 percent protein, grew as well as the controls from 7 to 25 weeks of age. Those fed oven-dried cow manure at the rate of 15 percent of total ration, however, grew more slowly throughout this test, and weighed 0.35 pound less at the termination of the study. Had the number of pullets per group been greater, a difference of this magnitude would probably have been significant. Each of the lots supplemented with cow manure consumed less total feed than did the controls; but, on the basis of pounds feed per pound of gain, each consumed more feed.

Despite the inclusion of 5 and 10 percent oven-dried cow manure, the pullets matured at about the same rate and produced as well as the controls. Those fed 15 percent manure, however, were retarded in sexual maturity, and, during the first 5 weeks following the onset of egg production, the con-

trols definitely out-produced them, although not significantly. By 164 days of age all lots were laying above 50 percent, with a maximum range between lots of 6.8 percent. The conclusion agrees with that presented by Turner; that the concentration of androgenic hormone in rations containing 5 and 10 percent oven-dried cow manure was insufficient to suppress the gonadotrophic effect of the anterior pituitary. In both studies, concentrations above 10 percent cow manure appeared to retard sexual maturity; in this study, however, the difference was not significant.

Although the incidence of double-yolked eggs was not significantly different between rations, there was nevertheless a definite inverse relationship between concentration of cow manure and frequency of double-yolked eggs. Lot 4, receiving 15 percent cow manure, produced only 40 percent as many

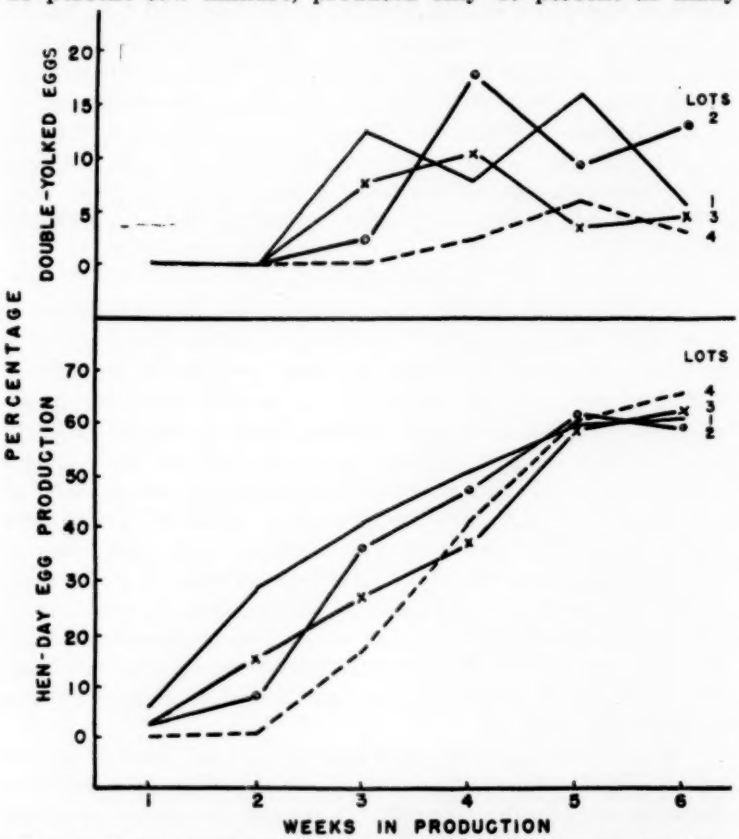

Fig. 2. Effect of oven-dried cow manure on egg production and the incidence of double yolked eggs.

double-yolked eggs as the controls and lot 3, fed 10 percent manure, produced 60 percent as many. Since Conrad and Warren (1940) reported that in normal chickens 65 percent of double-yolked eggs are due to the simultaneous development of two ova, these data suggest that newly matured pullets are extremely sensitive to trace quantities of androgenic hormones in cow manure, and respond to quantitative differences by delayed maturity, accompanied by less intense production including double ovulations. Upon the fifth week of egg production, however, no further semblance of sensitivity appeared to remain.

No explanation is advanced for the significant effect of cow manure on the incidence of broken eggs. Since blood calcium analyses were not made, it is idle to speculate on whether or not this difference was due to an interference of an

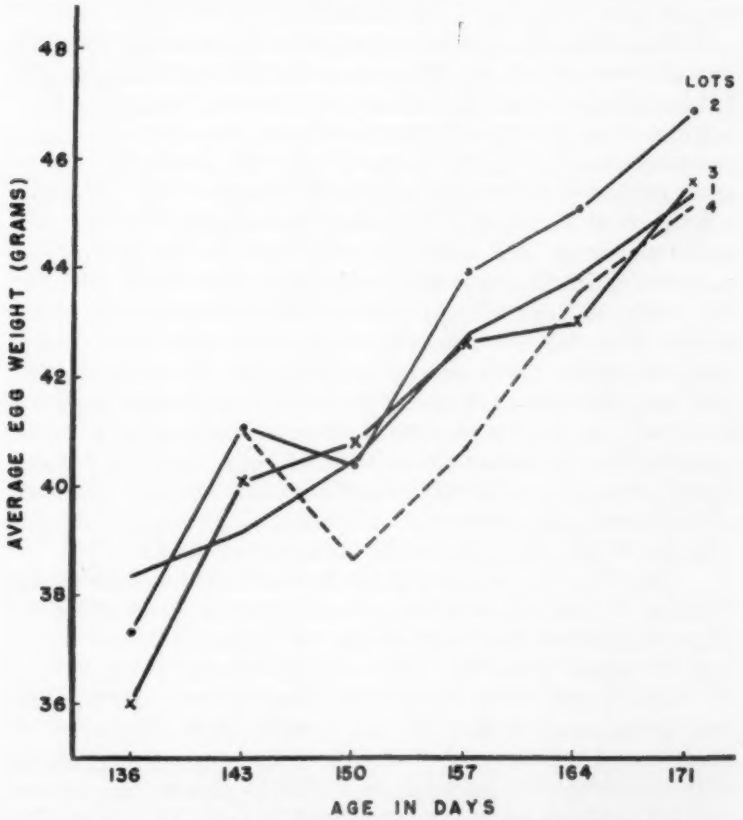

Fig. 3. Average weekly egg weights, excluding double yolked, broken, and soft shelled eggs.

androgenic hormone in cow manure on the interrelationships between the hormones of the pituitary, ovary, and the parathyroids. Since there was no association, *intra* treatment, between the incidences of broken and soft-shelled eggs, the problem is all the more puzzling.

These data suggest that 5 and 10 percent concentrations of oven-dried cow manure can be utilized to excellent advantage in grower rations. The tendency for birds fed 15 percent cow manure to grow more slowly, however, implies that it is not practical to feed so high a concentration under ordinary circumstances. A depression in gain of 0.35 pound, observed in this study, would be too great a loss for large-scale producers. Despite this loss, if greater loss is certain due to a shortage of feed, the inclusion of 15 percent cow manure would then be justified and is recommended.

SUMMARY

Sixty New Hampshire pullets were randomized into four lots at 7 weeks of age. They were fed rations containing 0, 5, 10, and 15 percent oven-dried cow manure. Additional herring meal was provided in each cow manure ration to equalize the crude protein. At 25 weeks of age the pullets in each lot averaged 5.64, 5.44, 5.42, and 5.29 pounds. They consumed a total of 31.45, 30.17, 30.61, and 30.30 pounds of feed with an efficiency of 7.75, 7.85, 8.12, and 8.10 pounds of feed per pound of gain. The first egg per lot was observed at 130, 132, 133, and 142 days of age, and the four lots attained, during 164 to 171 days of age, 60.4, 58.9, 62.2, and 65.7 percent egg production. Their average egg size per lot was 42.6, 44.6, 43.1, and 42.8 grams. The incidence of double-yolked eggs was 9.0, 10.6, 5.4, and 3.6 percent of all eggs produced to 25 weeks of age. The incidence of soft-shelled eggs was very small. There were no statistically significant differences within any of the above comparisons. A statistically significant difference was observed, however, in the incidence of broken eggs.

The data suggest that there is insufficient gonadotrophic hormone in rations containing 5 and 10 percent oven-dried cow manure to retard growing pullets with respect to growth rate, age at sexual maturity, and subsequent egg production to 25 weeks of age. When 15 percent oven-dried cow manure was fed, however, growth rate was slower, sexual maturity retarded, and intensity of ovulation reduced. Although consistent, the differences between the lot fed 15 percent cow manure and the controls were not significant.

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INDICATED 1951 WORLD EGG PRODUCTION

The production of eggs during 1951 by selected countries[1] is indicated at approximately 1 percent above that of 1950 according to information available to the Office of Foreign Agricultural Relations. The change in the level of production has not been uniform in all countries is as much as the output is lower in a number of surplus producing countries in Northwestern Europe. These decreases are more than offset by the increases in other countries, principally the United States, Western Germany, France, Italy, Austria, the Netherlands and Finland. The indicated 1951 level of production will exceed the average prewar output of this selected group of countries by about one-half. This is due largely to the 70 percent increase in production in the United States which accounts for more than one half of all the reported egg output of the 21 countries reporting in both 1951 and the prewar years.

The indicated increases in egg production in 1951 are the result of (1) higher chicken numbers in many countries during 1951, resulting in turn either from the large carryover from 1950 or the large hatch of 1951, and (2) the better rate-of-lay in a number of countries due to improved quality of birds, better disease control and better feeding.

In the feed-importing countries, feed is becoming higher in price and more difficult to obtain. Consequently, governmental policy has been directed toward keeping the size of flocks in direct proportion to the amount of feed that can be

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[1] Includes Canada, United States, Cuba, Austria, Belgium, Denmark, Finland, France, Western Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United Kingdom, Turkey, Argentina and Australia.

home grown by the poultry keepers. This policy already has resulted in leveling off or decreases in egg production in several countries and will continue to affect these and other countries. It has succeeded in promoting the utilization of indigenous feed but has also limited specialized enterprises.

The Canadian output of eggs in 1951 is expected to increase slightly over 1950 due to the larger hatch in 1951. The United States output is expected to slightly exceed that of 1950. In Western Europe, production is expected to increase considerably in Austria, Finland, and Western Germany and to a lesser extent in France, Greece, Italy and the Netherlands. Production is expected to decrease in Belgium, Denmark, Ireland, Norway, Sweden and the United Kingdom. Production will increase slightly in Turkey, Argentina and the Union of South Africa and will decrease somewhat in Australia.

United States, egg production in the first eight months of 1951 was about 1 percent below the same period in 1950 due to the smaller number of layers on farms. However, the number of layers will about equal last year's numbers in September and October and will be up in November and December. This, with the rate-of-lay for nearly every month of 1951 higher than for 1950, is expected to result in a slight increase in total egg production for 1951.

In *Canada*, egg production in 1951 was slightly below 1950 levels during both the second quarter and the first six months of the year. However, the chick hatch in June 1951 was about 20 percent over that of 1950 and the number of chickens on farms showed an increase of 16 percent. This, with the very strong domestic demand for eggs, indicates a slight increase in production in 1951 as compared to 1950.

In *Austria*, chicken numbers in 1951 are at a somewhat higher level than in 1950 and management practices are improving. Egg prices are high relative to prices for other foods such as pork and potatoes and the controlled price for grain affords a favorable egg-feed price ratio. It is expected that egg production in 1951 will be about 11 percent above that of 1950.

In *Belgium*, the number of laying hens in 1951 is less than in 1950 and, despite an increase in the rate-of-lay, the 1951 egg production is expected to be less than that of 1950. This is largely due to the unfavorable egg-feed ratio of late 1950 and early 1951 which resulted from relatively low egg prices and high prices for feed.

In *Denmark*, a decrease in the number of layers is expected to more than offset the increasing rate-of-lay and to

result in a lower production of eggs in 1951 than in 1950. As with most other feed importing countries, an unfavorable egg-feed ratio has resulted from relatively low prices for eggs and high prices for feed.

In *Finland*, the number of chickens carried over into 1951 was higher than in 1950. It is expected that egg production in 1951 will be about 7 percent over that of 1950 and there will be a surplus of 15 to 20 million eggs available for export.

In France, the 1951 production of eggs is expected to be about 6 percent above that of 1950, largely as a result of an increased rate-of-lay. Even though the egg-feed ratio is less favorable than in 1950, there is a lack of a profitable alternative to poultry raising. The poultry industry, almost exclusively one of small farm flocks, expects the market for poultry meat to be favorable and, therefore, will not reduce the number of chickens.

In *Germany*, chicken numbers and egg production in 1951 continued the postwar increase. Large numbers of eggs were being imported in 1951 and this is expected to continue even though production of eggs in 1951 is expected to be about 15 percent higher than in 1950.

In *Greece*, the number of layers in 1951 is estimated to be about 4 percent above that of 1950. This, with the higher rate-of-lay resulting from better feeding and disease control and better quality of birds is expected to raise the 1951 output of eggs by about 11 percent over that of 1950.

In *Ireland*, egg production for 1951 is expected to be about 16 percent below that of 1950. Producer dissatisfaction with the British market for eggs and the relatively more profit enterprises such as beef and dairy cattle are in the main responsible for this shift to an almost completely domestic egg market. In addition, high feed costs and high mortality from disease have resulted in a 12 percent decrease in poultry numbers on June 1 in 1951 as compared to 1950.

In *Italy*, poultry raising is almost entirely confined to small farm flocks. It is estimated that chicken numbers are gradually increasing and that egg production in 1951 will be about 7 percent greater than in 1950. Feed prospects are relatively favorable and increasing interest is being shown in improving the quality of birds and in disease control.

In the *Netherlands*, the number of hens and pullets carried over into 1951 was considerably larger than that of one year earlier. Despite feed restrictions in the early months of 1951, egg production for the year is expected to be up at least 3 percent above that of 1950. The lack of a contract with the

United Kingdom in late 1950 has resulted in higher prices for Netherlands producers and in large exports to Western Germany in 1951.

In *Norway*, the small hatch of 1950 has resulted in a decrease in chicken numbers in 1951 and an increased proportion of second year layers. This, with the sharply reduced feed allocations, especially to commercial poultry producers, has resulted in a decrease in the rate of egg production in 1951. Egg output for year is expected to be about 11 percent below that of 1950.

In *Sweden*, chicken numbers in April 1951 were slightly below those of 1950 since the increase in young chickens did not quite offset the decrease in laying hens. Due to the decrease in chicken numbers and relatively difficult feed situation, egg output for 1951 is expected to be about 2 percent below that of 1950. Export markets continue good with Western Germany the major customer.

In *Switzerland*, the number of laying hens has declined slightly because sales of eggs and poultry are not as profitable as in past years. Thus, a slight decrease in egg output in 1951 is likely. Since consumption remains stable, imports of eggs will probably increase somewhat in 1951.

In the *United Kingdom*, poultry numbers as of March 1951 were about 3 percent higher than for one year earlier but receipts at egg packing stations during the first half of 1951 were nearly 8 percent below those of a year earlier. Imports of shell eggs during the first half of the year were 47 percent lower than for the same period in 1950 and no eggs have been sold "off the ration." The more than usual cold and wet weather through the winter and spring until the middle of June has been in part responsible for the decreased receipts and packing stations and there may be a shift to autumn and winter egg production underway. Any increase in output during the last half of 1951 due to this shift in production will not be enough to offset the earlier low production and the output for the year is expected to be less than for 1950.

In *Turkey*, chicken numbers are considered to be gradually increasing. More attention is being given to disease control and improved feeding and breeding. Egg output for 1951 is expected to be slightly above that of 1950.

In *Argentina*, the production of eggs during the year ending July 31, 1951 was about 10 percent over the previous year and another increase is expected during 1951-52. Increased domestic demand is expected to take most of the

EGGS

Number produced[1] in specified countries, average 1934-38, annual 1946-1950, indicated 1951

Continent and country	Average 1934-38	1946	1947	1948	1949	1950	Indicated 1951
	Million	Million	Million	Million	Million	Million	Million
North America							
Canada	2,638	3,883	4,484	4,274	3,774	3,662	3,700
United States	35,498	55,590	55,252	55,158	56,629	60,046	60,500
Cuba	320	300	312	288	318	320	320
Dominican Republic	——	60	60	60	60	60	——
Guatemala	——	——	——	——	50	——	——
Panama	——	——	52	——	54	——	55
Europe							
Albania	143	——	——	——	——	——	——
Austria	663	270	285	350	400	540	600
Belgium	1,693	1,100	1,380	1,440	1,900	2,100	2,000
Bulgaria	682	——	——	——	——	——	——
Czechoslovakia[2]	1,958	776	903	1,110	1,380	——	——
Denmark	1,979	883	992	1,392	1,870	2,100	2,000
Finland	317	93	117	176	266	317	340
France	6,200	6,200	6,300	6,100	6,800	7,100	7,500
Germany (Tri-Zone)	4,500	2,150	1,975	2,250	2,800	4,100	4,700
Greece	550	349	376	384	390	450	500
Hungary	1,050	——	650	750	——	——	——
Ireland	1,086	801	733	844	1,014	1,020	860
Italy	5,500	3,600	4,300	4,450	4,550	5,000	5,350
Luxembourg	40	——	30	35	40	40	40
Netherlands	1,978	480	1,052	1,159	1,520	1,900	1,950
Norway	369	155	198	263	340	450	400
Poland and Danzig	3,500	2,276	——	——	——	——	——
Portugal	250	——	——	——	——	——	——
Rumania	1,500	532	——	——	——	——	——
Spain	1,700	——	1,992	1,800	1,800	1,920	——
Sweden	900	1,149	1,217	1,335	1,334	1,464	1,428
Switzerland	423	391	442	520	559	530	529
United Kingdom:							
Farm[4]	[5]3,871	2,418	2,600	3,000	3,500	——	——
Total[4]	[5]5,098	3,850	4,000	4,300	5,000	5,800	5,500
Yugoslavia	1,000	——	——	——	——	——	——
Asia							
Lebanon	——	65	60	48	42	45	——
Palestine	108	200	——	——	——	——	——
Syria	92	120	90	110	120	——	——
Turkey	1,003	863	895	852	850	856	860
Japan	3,553	618	663	790	1,214	1,568	——
India	——	2,794	——	——	——	1,082	——
Pakistan	——	571	——	——	——	——	——
Philippine Islands	——	240	400	605	652	740	——
South America							
Argentina	1,127	——	——	——	——	2,700	2,900
Chile	——	520	460	370	400	400	——
Paraguay	——	——	100	110	120	120	——
Peru	——	——	——	——	——	——	——
Uruguay	289	358	326	330	291	300	——
Africa							
Egypt	751	——	——	——	——	——	——
French Morocco	1,000	——	——	——	——	——	——
Union of S. Africa	——	——	372	——	800	900	950
Oceania							
Australia[6]	708	1,358	1,470	1,431	1,443	1,350	1,300
New Zealand	430	——	——	——	450	——	——

1 Relates to farm production in Canada and the United States, but data for many countries not explicit on this point. 2 Postwar numbers possibly under reported. 3 Fifty-eight counties. 4 Year ending May of year indicated. 5 Three-year average. 6 Commercial production for year ending in June of year reported.

greater output and exports of eggs are not expected to exceed those of 1950. Prices to producers for eggs were satisfactory in 1950 and have increased more than costs thus far in 1951.

In the *Union of South Africa*, the government egg purchasing program has proved an incentive to producers to increase chicken numbers. This has resulted in an increase in egg production during the latter part of the 1950-51 season which has continued into the 1951-52 season. Prices to producers are favorable and Newcastle disease appears to be under control.

In *Australia*, egg production during the first half of 1951 was about 3 percent less than for the same period of 1950. This decline in output has resulted from a decrease in the number of laying hens. Chicken mortality has been high due to unusually hot weather and a number of commercial poultry farms have gone out of business. Feed shortage and high prices and the increased numbers of poultry killed for meat have also contributed to the decline in output of eggs.

(This is one of a series of regularly scheduled reports of world agricultural production approved by the Office of Foreign Agricultural Relations Committee on Foreign Crop and Livestock Statistics. It is based in part upon U. S. Foreign Service reports.

Foreign Agriculture Circular, Office of Agricultural Relations, United States Department of Agriculture, Washington, D. C. September 17, 1951.

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CROSSBRED PULLETS LEAD IN EGG PRODUCTION

Crossbred pullets again produced considerably more eggs than pure-bred pullets resulting from the nine selective breeding systems under trial at the Commonwealth Scientific and Industrial Research Organization Poultry Research Centre, Werribee, Victoria, Australia, according to a progress report for 1949-50.

The Centre was founded in 1946 as part of its Division of Animal Health and Production and by 1948 was sufficiently developed to commence the breeding of nine closed flocks formed from a foundation of Single Comb White Leghorns by using different systems of selection and mating. Australorps and some Rhode Island Reds are also being bred and are being used in two- and three-way crosses.

The analysis of the results which are presented below are based on production for a period from the first egg until 31st May, 1950, for all pullets hatched during 1949. The figures quoted are of average partial winter egg production which has been shown to be a reliable guide to the egg production for the year, and one which can be used to predict performance early in the year the bird hatches.

Three years' observations on three crossbred flocks bred from Leghorns and Australorps show that they are superior to their pure-bred parents in egg production and other economic traits. The crossbreds showed better hatchability, higher resistance to disease and good meat quality, and they produced at least twelve more eggs per year than the pure parental breeds.

During the period under review there were 292 pullets from different crosses and they produced an average of 43 eggs up to May 31: 59 pullets, progeny from a first cross mating of a Leghorn sire with Australorp dams, laid an average of 46 eggs compared with 31 by the White Leghorn control group, and 36 eggs by an Australorp flock which consisted of 112 pullets. By mating Leghorn X Australorp or Australorp X Leghorn dams with a Rhode Island Red sire a 3-way cross was produced which laid as well as the 2-way cross. Similarly good results were obtained from a permanent zig-zag cross. For that purpose 2-way cross-bred females were mated back to a sire of one of the parental breeds, White Leghorn and Australorp. The following year, females from this backcross were mated to a sire of the second parental breed, the third year female progeny from the previous year's

mating was mated to a sire of the first parental breed, and so on.

The experiments also show the progress that can be made in purebred flocks in only two generations. Of the nine selective breeding systems under trial only two have as yet influenced egg production significantly. Both of these systems are based on the selection as parents of sires and dams which have been proven by progeny test to be superior in one of the characteristics affecting egg production. In two generations these systems have raised average partial winter egg production in Leghorns from 31 to 38.

In the 1949-50 period, the mean average partial winter production of the 986 Leghorns under test was 36 eggs. The control group of Leghorns within which none of the eight breeding systems was used, produced an average of 31 eggs during the same period. One of the superior groups produced by selection based on progeny test consisted of 309 pullets, the daughters of 11 tested sires, and had an average production of 39 eggs up to 31st May. The second superior group consisted of 302 pullets from 8 tested sires and had an average production of 38 eggs.

Although good results were also obtained by mating high producing dams with sons of outstanding producers, the group consisted of only 42 pullets. This is too small a number to permit a decision to be reached on whether their average production of 37 eggs was due to chance or to the breeding system. There was, however, no doubt that a group selected from low producing dams and mated with the sons of low producers, was laying, on the average, less eggs than the progeny from high producers (27 eggs against 37). Thirty-eight pullets from parents selected by a poultry expert as being of excellent type did not produce more eggs than the unselected control group, nor was early progress shown in the group of 93 pullets bred according to the Hagedoorn Superior Sire method.

TOM NEWMAN MEMORIAL AWARD

This International Award which was initiated by the Poultry Association of Great Britain and is given for what is considered by the Award Committee in the United Kingdom to be the most important contribution in poultry husbandry

research work published in the previous year for the benefit of poultry husbandry, has been made this year, for work published in 1950, to Dr. E. L. R. Stokstad of Lederle Laboratories, American Cyanamid Company, Pearl River, New York, U.S.A. The Award has now been in being for three years and has hitherto been won by Dr. H. R. Bird, Beltsville, Md., U.S.A. and D. F. R. Beaudette, New Brunswick, New Jersey, U.S.A.

There are Corresponding Secretaries in communication with the Award Committee in the U.K. in each country in which poultry husbandry has been developed as an industry. The Award consists of a gold medal and a prize of £50.

Particulars of the research work published in 1950, with which Dr. Stokstad is concerned, are as follows:

Further Observations on the 'Animal Protein Factor'. By Stokstad, E. L. R. and Jukes, T. H., Proc. Soc. Exptl. Biol. Med., 73, 523 (1950).

Growth-Promoting Effect of Aureomycin on Pigs by Jukes, T. H.; Stokstad, E. L. R.; Taylor, R. R.; Cunha, T. J.; Edwards, H. M., and Meadows, G. B., Arch. Biochem. *26*, 324 (1950).

Some Characteristics of a Crystalline Compound Derived from Vitamin B_{12} by Brockman, John A., Jr.; Pierce, J. V.; Stokstad, E. L. R.; Broquist, H. P., and Jukes, T. H., J. Am. Chem. Soc. *72*, 1042 (1950).

Effect of Vitamin B_{12} on the Response to Homocystine in Chicks by Jukes, T. H.; Stokstad, E. L. R., and Broquist, H. P., Arch. Biochem. *25*, 453 (1950).

Some Biological and Chemical Properties of the Citrovorum Factor by Broquist, H. P.; Stokstad, E. L. R., and Jukes, T. H., J. Biol. Chem. *185*, 399 (1950).

Studies of Some Characteristics of Vitamin B_{12b} by Pierce, J. V.; Page, A. C., Jr.; Stokstad, E. L. R., and Jukes, T. H., J. Am. Chem. Soc. *72*, 2615 (1950).

Relation of Vitamin B_{12b} to Vitamin B_{12} and the Biological Activities of these Compounds, by Stokstad, E. L. R.; Jukes, T. H.; Brockman, J. A.; Pierce, J. V.; and Broquist, H. P., Federation Proc. *9*, 235 (1950).

Some Biological and Chemical Properties of the Citrovorum Factor by Broquist, H. P.; Stokstad, E. L. R.; and Jukes, T. H., Federation Proc. *9*, 156 (1950).

Vitamin B_{12} and "Citrovorum Factor" in the Nutrition of *Lactobacillus leichmannii* and *Leuconostoc citrovorum*, by Jukes, T. H.; Broquist, H. P., and Stokstad, E. L. R., Arch. Biochem. *26*, 157 (1950).

Role of Protogen in the Nutrition of an Unidentified Corynebacterium by Stokstad, E. L. R.; Hoffman, C. E.; and Belt, M., Proc. Soc. Exptl. Biol. Med., *74*, 571 (1950).

Pteroylglutamic Acid Antagonists by Jukes, T. H.; Franklin, A. L., and Stokstad, E. L. R., *52*, 1336 (1950).

Growth-Promoting Effect of Aureomycin on Turkey Poults by Stokstad, E. L. R. and Jukes, T. H., Poultry Science, *29*, 611 (1950).

Synthesis and Isolation of a Crystalline Substance with the Properties of a New B Vitamin by Brockman, J. A. Jr.; Roth, Barbara; Broquist, H. P.; Hultquist, M. E.; Smith, J. M., Jr.; Fahrenbach, M. J.; Cosulich, D. B.; Parker, R. P.; Stokstad, E. L. R., and Jukes, T. H., J. Am. Chem. Soc. *72*, 4325 (1950).

Vitamin B_{12} and Some of its Interrelationships by Stokstad, E. L. R., and Jukes, T. H. Paper presented at American Chemical Society Meeting, April, (1950).

REVIEW OF POULTRY PUBLICATIONS

Compiled by J. W. Kinghorne,
1365 Iris St., N. W.
Washington 12, D. C., U.S.A.

GENETICS

BERNIER, P. E., L. W. TAYLOR, and C. A. GUNNS. *(Univ. of California.)* THE RELATIVE EFFECTS OF INBREEDING AND OUTBREEDING ON REPRODUCTION IN THE DOMESTIC FOWL. Parts I-V. *Hilgardia 20:* 529-628. April 1951. *(Experiment Station Record)

BRILES, C. O., W. E. BRILES, and J. H. QUISENBERRY. *(A. and M. Coll. Texas, College Station.)* THE LINKAGE RELATIONSHIPS BETWEEN THE LOCI PRODUCING THE BLOOD GROUP ANTIGENS AND OTHER MARKED LOCI. *Poultry Sci. 29:* 750-751. 1950. —*An abstract.* (Biological Abstracts)

BRILES, W. E., C. O. BRILES, and J. H. QUISENBERRY. *(A. and M. Coll. Texas, College Station.)* THREE LOCI AFFECTING THE BLOOD GROUP ANTIGENS OF THE CHICKEN. *Poultry Sci. 29:* 750. 1950.—*An abstract.* (Biological Abstracts)

CHAMPION, LLOYD R. *(U. Wisconsin, Madison.)* THE INHERITANCE OF RESISTANCE TO CECAL COCCIDIOSIS IN THE DOMESTIC FOWL. *Poultry Sci. 29:* 753. 1950.—*An abstract.* (Biological Abstracts)

COLE, L. J., and W. F. HOLLANDER. *(U. Wisconsin, Madison.)* HYBRIDS OF PIGEON X RING DOVE. *Amer. Nat. 84:* 275-307. 1950. —The "type hybrid" of *Columbia livia* x *Streptopelia risoria* is in general intermediate in form, except that female hybrids from dove mothers are rare, small, and delicate. A tendency for male hybrids to have relatively long tarsi is noted. The growth rate (body wt.) is intermediate with little difference in reciprocal crosses. Hatching periods average between those of the parent spp. From 36 successful matings, over 100 classifiable hybrids were studied. Most of the variation depended on genetic mutant traits from the pigeon parent. These traits, if dominant, were expressed much as in intraspecific crosses. Recessive mutant traits did not appear except when sex-linked. The "dilute" gene of pigeons is shown to be an allele of the "blond" and "white" genes of the ring dove. Sex-linked genes in the crosses indicate that no sex reversal occurs. Wing and tail patterns offer special problems, discussed in detail. Fertility of male hybrids backcrossed to pigeons has been zero, but up to 10% in backcrosses to ring doves. Much variation in sperm abnormality was

*(Experiment Station Record) refers to the records kept by the Office of Experiment Stations, U. S. Dept. of Agr., Washington 25, D.C.

found. Progeny (75% dove) were all males, intermediate in form between F_1 and ring dove. These gave no fertility in 661 eggs of further backcrossing to ring dove. There is a possibility that they may be triploid. —*Authors.* (Biological Abstracts)

DICKERSON, G. E., Q. B. KINDER, W. F. KRUEGER, and H. L. KEMPSTER. *(U. Missouri, Columbia.)* HETEROSIS FROM CROSSBREEDING AND FROM OUTBREEDING. *Poultry Sci. 29:* 756. 1950. —*An abstract.* (Biological Abstracts)

EL-IBIARY, H. M., and C. S. SHAFFNER. *(U. Maryland, College Park.)* THE EFFECT OF INDUCED HYPOTHYROIDISM ON THE GENETICS OF GROWTH IN THE CHICKEN. *Poultry Sci. 29:* 757. 1950.—*An abstract.* (Biological Abstracts)

GONZALEZ CHAPEL, A. COMPARATIVE PERFORMANCE OF THE NATIVE PUERTO RICAN FOWL, THE WHITE LEGHORN, THE NEW HAMPSHIRE, AND CROSSES BETWEEN THEM. *Jour. Agric. Univ. Puerto Rico 31:* 265-302. 1947.—The productive capacity of the native fowl of Puerto Rico, judged by egg production, egg wt. and body wt. is less than that of the White Leghorn and New Hampshire. Crosses of the native showed some improvement over the native, but were inferior to the standard breeds. The native fowl showed no apparent superiority over the imported breeds in either viability or disease resistance.—*G. N. Wolcott.* (Biological Abstracts)

JONES, D. G., and WM. KOHLMEYER. *(South Dakota State Coll., Brookings.)* THE INHERITANCE OF AN ABNORMAL FEATHER CONDITION (WOOLY) IN WHITE PLYMOUTH ROCK CHICKENS. *Poultry Sci. 29:* 766. 1950.—*An abstract.* (Biological Abstracts)

RAIMO, HENRIQUE FRANCISCO. *(Sec. Agr. Sao Paulo, Brazil.)* PRESENCA DE MALHAS DE COR EM PINTOS DE UM DIA NEW-HAMPSHIRE EM RELACAO AO SEXO E A COLORACAO DA PLUMAGEM DO ADULTO. [COLOR MARKINGS IN DAY-OLD NEW HAMPSHIRE CHICKS IN RELATION TO SEX AND ADULT PLUMAGE.] *Bol. Indust. Animal 9:* 3-14. 1947.—Color markings were present on only 26.3% of 1339 day-old New Hampshire chicks. Only 11% of male chicks and 40% of female chicks showed markings. Of all marked chicks 80.6% were females, all spotted and striped chicks were 100% females. 100% of spotted and 67% non-spotted male chicks developed dark chestnut-red adult plumage. Only 19% of non-spotted female chicks had chestnut-red adult plumage.—*A. O. Rhoad.* (Biological Abstracts)

SANDOVAL, MARIANO A. *(University of the Philippines, College of Agriculture, College, Laguna).* GROWTH AND MATURITY OF THE FIRST-GENERATION PROGENY OF NEW HAMPSHIRE AND S. C. WHITE LEGHORN CHICKENS IMPORTED FROM THE UNITED STATES. *Philippine Agriculturist, 34:* 26-33. 1950.—The results of this study showed that the weanlings of both breeds were smaller than those weaned from the imported chicks. The difference in percentage of mortality between the two breeds was insignificant, although the S. C. White Leghorn chicks had a higher percentage of mortality than the New Hampshires. The first-generation progeny of the two breeds laid their first eggs much later than the original stock, the New Hampshire pullets requiring an average of 267.4 days to mature, and the S. C. White Leghorns, 220.3 days. At maturity, the New Hampshire pullets had an average weight of 1942.3 $\mp$ 66.26 grams, and the S. C. White Leghorns, 1428.5 $\mp$ 32.98 grams. The first ten eggs laid by the New Hampshire pullets weighed 53.7 $\mp$ 0.34 grams on the average and those of the S. C. White Leghorns, 44.6 $\mp$ 0.62 grams.—*F. M. Fronda.*

PHYSIOLOGY

BOLTON, W. *(Poultry Res. Centre, Edinburgh, Scotland.)* FREE AND COMBINED RIBOFLAVIN IN THE BLOOD SERUM OF OESTROGENIZED FOWLS. *Nature* [*London*] *166:* 912-913. 1950.—Immature pullets given 7 doses of 3 mg. estradiol benzoate on alternate days showed fully developed oviducts, but quiescent ovaries, free serum riboflavin was increased from 0.02-2.54 ppm., while flavin mononucleotide and flavin adenine dinucleotide were unaffected.—*Roland Walker.* (Biological Abstracts)

BOYD, G. S. *(U. Edinburgh, Scotland.)* CHOLINE AND METHIONINE IN THE EMBRYONATED HEN EGG. *Biochem. Jour. 47:* xlvii-xlviii. 1950.—Choline in unincubated eggs averaged 183 mg./egg while methionine averaged 165 mg./egg. Embryonic contents of both increase regularly with incubation. (Biological Abstracts)

COMMON, R. H., T. J. KEEFE, R. BURGESS, and W. A. MAW. *(McGill U., P. Q., Canada.)* MODIFICATION OF THE BIOCHEMICAL RESPONSES OF THE IMMATURE PULLET TO OESTROGEN BY MEANS OF DIETARY AUREOMYCIN. *Nature* [*London*] *166:* 992-993. 1950.—Of 4 groups of 7-week pullets on stock diet, 2 were given 6 mg. estradiol benzoate and 3 mg. testosterone in divided doses (6 injns.). One of these, and one uninjected group were fed 20 mg. aureomycin per lb. of food. This did not affect the great increase in oviduct wt., nor the liver wt.; but it enhanced the estrogen effect on serum Ca (from 34.7 up to 49 mg. %), and on serum riboflavin (from 1.03-1.85 μg./ml.). —*Roland Walker.* (Biological Abstracts)

GARREN, HENRY W., and C. S. SHAFFNER. *(U. Maryland, Coll. Park.)* THE EFFECT OF STORAGE TEMPERATURE AND TIME ON FERTILIZING CAPACITY OF COCK SEMEN. *Poultry Sci. 29:* 758. 1950.—*An abstract.* (Biological Abstracts)

GOWE, R. S. *(Central Experimental Farm, Ottawa, Ont.)* THE EFFECT OF DIFFERENT DOSES OF SEMEN ON THE DURATION OF FERTILITY IN FOWL. *Poultry Sci. 29:* 760. 1950.—*An abstract.* (Biological Abstracts)

HARKMARK, W., and K. GRAHAM. A METHOD FOR OPENING AND CLOSING EGGS WITH AN EXPERIMENTAL DEMONSTRATION OF ITS ADVANTAGES. *Anatomical Record 110:* 41, May 1951.—The essential points in the method suggested here are:

1. The natural air cell is not re-established.
2. The eggs are not turned during the subsequent incubation.

The two methods have been compared in hatching experiments with normal eggs as controls. The experiments demonstrate that whether the air cell is re-established or not, turning of the closed egg during incubation is unnecessary, or even injurious. (Experiment Station Record)

HARTMAN, F. A., and R. H. ALBERTIN. A PRELIMINARY STUDY OF THE AVIAN ADRENAL. *The Auk (A Quarterly Jour. of Ornithology) 68:* 202. April 1951.—The adrenals are located on the anterior poles of the kidneys just below the lungs and posterior to the gonads. In most species they are separate, but in a few they are fused into a single organ. The adrenals differ greatly in shape, often being irregular and varying among different individuals in the same species. Their color may be cream, yellow, or orange, but is sometimes pink, gray, or reddish brown. Microscopically the chromaffin tissue forms a pattern varying from scattered islets to an interwoven network, depending upon the amount of tissue present. (Experiment Station Record)

JUHN, MARY. *(U. Maryland, College Park.)* NON-EFFECT OF A GROWTH HORMONE PREPARATION IN THE REGENERATING FEATHER. *Proc. Soc. Exptl. Biol. and Med. 76:* 118-120. 1951.—An attempt was made to cause acceleration of feather growth in fowl by injns. of growth hormone in the vicinity of regenerates. The prepn. used gave a 20-g. body wt. increase in 15 days in the hypophysectomized rat in dosages of 50 μg. per 50 g. body wt. 6 Brown Leghorn males each received 40, 160, and 320 μg. over a period of weeks. One fowl was given 10 mg. daily for 5 days. All tests were negative in feather growth, but induced pattern changes indicated the presence of traces of thyrotrophin in the prepn.—*Mary Juhn.* (Biological Abstracts)

KOSIN, I. L., and HANS ABPLANALP. *(State Coll. Washington, Pullman.)* THE PATTERN OF EGG LAYING IN TURKEYS. *Poultry Sci. 30:* 168-179. 1951.—Over a period of 4 mos., Feb.-May, turkeys of 2 breeds, Beltsville Small Whites and Broad Breasted Bronze, were supplied with artificial light—2.5 foot candles per bird from 7 a.m. to 6 p.m. daily. All hens were trapnested at hourly intervals from 8 a.m. to 5 p.m. and then once at 8 p.m. The eggs were weighed to the nearest gram. In all, 1197 clutches were observed in the Broad Bresated Bronze breed, and 617 in Beltsville Small Whites. Egg wt. was found to decrease for successive eggs within clutches. A tendency of lower mean egg wt. in longer clutches was indicated only in the Broad Breasted Bronze. Time intervals between ovipositions shortened with increasing clutch length, with a lower limit of approx. 25 hrs. The interval before the last egg of a clutch was invariably the longest, showing also high variance. The frequency of ovipositions was found to be highest in March. Breed differences were found in the seasonal trend of mean hr. of ovipositions. The over-all avg. time of oviposition appeared to be at 1.45 p.m. An observed marked delay in the hour clutch start, with longer pauses between clutches, is believed to be related mainly to broodiness. No seasonal trends in the hour of clutch start were found, indicating that this characteristic was not affected by longer daily light periods. The time of first oviposition in a clutch can be used as a criterion for identifying intensive layers. Variations in the number and length of clutches show definite dependence on season.—*Authors.* (Biological Abstracts)

LORENZ, F. W., MAMIE CAVOULAS, and J. D. CARSON. *(U. California, Davis.)* DEPOSITION OF P^{32} IN COCK SPERMATAZOA. *Poultry Sci. 29:* 769. 1950.—*An abstract.* (Biological Abstracts)

MARSHALL, MARGARET E., and H. F. DEUTSCH. *(U. Wisconsin, Madison.)* DISTRIBUTION OF EGG WHITE PROTEINS IN CHICKEN BLOOD SERUM AND EGG YOLK. *Jour. Biol. Chem. 189:* 1-9. 1951.—The distribution of the egg white proteins, ovalbumin, conalbumin, lysozyme, and ovomucoid in egg yolk and in embryo and adult chicken serum was studied. Only ovalbumin and conalbumin were detectable immunologically. Their concns. were determined quantitatively by the precipitin reaction. Conalbumin was isolated from chicken serum. The diffusion constant and isoelectric point of this prepn. differed from those of the conalbumin from egg white, but its molecular wt. was similar. Immunologically, the conalbumin from the 2 sources appeared identical, and both proteins have the same Fe-binding capacities. Conalbumin is not present in sufficient amounts in chicken serum to account for the total Fe-binding capacity of this system.—*M. E. Marshall.* (Biological Abstracts)

MORENG, ROBERT E., and C. S. SHAFFNER. *(U. Maryland, College Park.)* LETHAL INTERNAL TEMPERATURES FOR THE CHICKEN, FROM FERTILE EGG TO MATURE BIRD. *Poultry Sci. 30:* 255-266. 1951.—Data were collected on over 3000 eggs and 920 chickens at various ages. Low temp. exposure was -10°F. (-23.3°C.); high temp. exposure was 160°F.(71.1°C.). When eggs were removed from the incubator and exposed to -10°F. for about 55 min., their internal temp. reached about 29°F. At this point the egg commenced to freeze

and the internal temp. remained constant for about 65 min. Total lethal exposure time to –10°F. was approx. 95 min., only about 40 min. of which the eggs' internal temp. was as low as 29° to 30°F. High lethal internal egg temp. for the embryo ranged from an avg. of 106° to 119°F., increasing, in general, as embryo development progressed. The avg. low lethal body temp. for chickens was found to be 60°F. on day of hatch and progressively increased to 72° for mature birds. The high lethal body temp. ranged from an avg. of 116° to 117° for all age groups. The data indicate that a change in the poikilothermic characteristics of the embryo takes place about the 7th day of incubation. At this point the lower limit of time considered lethal to the embryo decreases, while the high lethal internal egg temp. for the embryo rises. A chance is also indicated at hatching time when the chick's low lethal temp. rose from an avg. of 29°F. (80 minutes' exposure to –10°) to 60° (30 min. exposure to –10°). —*C. S. Shaffner.* (Biological Abstracts)

OLSEN, M. W. *(U. S. Dept. Agric., Beltsville, Md.)* EFFECT OF LOW TEMPERATURE ON THE HATCHABILITY OF EGGS FROM VARIOUS STANDARDBRED AND CROSSBRED CHICKENS. *Poultry Sci. 30:* 180-183. 1951.—In studies of the relative difference in susceptibility to low storage temps. of chicken embryos in eggs from 12 vars. and crosses, eggs less than 24 hrs. old were stored at 32°F. for 3,4, and 5 days prior to incubation, and other eggs stored at 55°F. for 4 days prior to incubation, as controls. After these storage periods the eggs were incubated and hatchability data obtained. Embryos from all breeds and crosses tested were affected adversely as a result of storage at 32°F. Mortality was greatest among the embryos subjected to 32°F. for the longest period of time. Considerable variation was found among the various vars. and crosses in their degree of resistance to the low temp. Embryos from inbred White Leghorns and New Hampshires showed the greatest resistance; embryos from Black Minorcas showed the least.—*Auth. summ.* (Biological Abstracts)

PAULING, L., and R. B. COREY. THE STRUCTURE OF FEATHER RACHIS KERATIN. *Proc. National Academy of Sciences of the USA 37:* 256, May 1951. (Experiment Station Record)

PETERSON, JOHN E., and ALBERT E. HIRST. *(Coll. Med. Evangelists, Loma Linda, Calif.)* STUDIES ON THE RELATION OF DIET, CHOLESTEROL AND ATHEROMA IN CHICKENS. *Circulation 3:* 116-119. 1951.—The development of atherosclerosis was studied in 100 cockerels fed varying diets supplemented with lard, vegetable oil and cholesterol. During a period of 2 yrs. there was no apparent change in the degree of atheroma when the diet was supplemented with cottonseed oil or lard, and only the cholesterol-fed group showed a significant difference. Early lesions associated with cholesterol feeding apparently regress when cholesterol is withdrawn from the diet. Older lesions appear to be quite fixed.—*Authors.* (Biological Abstracts)

REDDICK, M. L. HISTOGENESIS OF THE CELLULAR ELEMENTS IN THE POSTOTIC MEDULLA OF THE CHICK EMBRYO. *The Anatomical Record 109:* 81, January 1951.—"Germinal cells" and epithelial cells are present in 7-day embryos, and are the source from which cells in early stages of differentiation are derived. (Experiment Station Record)

ROMANOFF, ALEXIS L. *(Cornell U., Ithaca, N. Y.)* ROLE OF CHEMICAL EMBRYOLOGY IN THE FIELD OF AVIAN REPRODUCTION AND PHYSIOLOGY. *Poultry Sci. 29:* 777. 1950.—*An abstract.* (Biological Abstracts)

ROMIJN, C. STOFWISSELINGSONDERZOEK BIJ DE KIP; DE INVLOED VAN ANTI-SCHILDKLIERSTOFFEN OP DE STOFWISSELING. [METABOLISM IN HENS: THE INFLUENCE OF ANTITHYROIDS ON THE METABOLISM OF HENS.] *Tijdschr. Diergeneesk. 75:* 839-850. 1950. (Biological Abstracts)

SIPERSTEIN, M. D., I. L. CHAIKOFF, and S. S. CHERNICK. *(Univ. of California.)* SIGNIFICANCE OF ENDOGENOUS CHOLESTEROL IN ARTERIOSCLEROSIS: SYNTHESIS IN ARTERIAL TISSUE. *Science 113:* 747, June 29, 1951.—Our finding that the artery is capable of synthesizing cholesterol, coupled with the observations on the stilbestrol-treated bird, indicates that endogenous cholesterol, originating within the artery itself and elsewhere in the body, may be of greater importance in the pathogenesis of spontaneous arteriosclerosis than has hitherto been supposed. (Experiment Station Record)

SKALLER, F., and G. W. GRIGG. *(Commonwealth Scientific and Industrial Research Organization, Australia.)* THE EFFECT OF ORALLY ADMINISTERED SYNTHETIC OESTROGEN "HEXOESTROL" ON THE MALE FOWL.—In three experiments, involving a total of 141 male fowls, the effect of orally administered hexoestrol on cockerels of different ages and breeds was observed, and the results were compared with those from untreated birds and capons. The results obtained support the hypothesis of a twofold action of oestrogen, viz. its action as a stimulator during an initial period and as a depressor of the anterior pituitary gland after a certain threshold level has been reached. The sensitivity to oestrogen increased with age, varied according to different breeds, e.g. White Leghorns gave a smaller response than Australorps, and varied according to tissue, e.g. it was higher for the testes than for the comb and epidermis. It was observed that the size of the testes in three-month-old cockerels varied greatly and that the amount of abdominal fat was not closely and reliably correlated with the total body fat. Oestrogen treatment improved the appearance of the carcass. Deposition of abdominal fat was increased only for Australorps and mature birds. Capons were superior in body-fat production to the oestrogen-treated birds. Fat from birds treated with hexoestrol (up to 25 mg. daily for three weeks) did not produce oestrogenic effects when injected into mice. The observations did not support the hypothesis of Wheeler and Hoffman (1948) that oestrogen treatment increases the occurrence of prolapse and "pickout."

SMOLELIS, A. N., and S. E. HARTSELL. *(Purdue U., Lafayette, Indiana.)* OCCURRENCE OF LYSOZYME IN BIRD EGG ALBUMINS. *Proc. Soc. Exptl. Biol. and Med. 76:* 455-456. 1951.—With a turbidimetric assay method for lysozyme, species variation between the albumins of different birds eggs was observed. The mg. of lysozyme/ml. of egg white (avg. of several tests) were as follows: bantam hen 6.9, quail 6.7, chicken 6.5, chuckar partridge 5.3, pheasant 3.4, guinea hen 3.1, duck 1.8, horned lark 1.0, herring gull 0.89. A turbidity problem prevented assaying the whites from turkey or goose eggs. By use of a modified agar-cup method of assay wherein *Micrococcus lysodeikticus* was the test species, a bacteriolytic and a bacteriostatic principle (presumably lysozyme) was demonstrated in the egg white of the turtle.—*Authors.* (Biological Abstracts)

STURKIE, PAUL D. *(Rutgers U., New Brunswick, N. J.)* PLASMA PROTEINS OF CHICKENS AS INFLUENCED BY TIME OF LAYING, OVULATION, NUMBER OF BLOOD SAMPLES TAKEN AND PLASMA VOLUME. *Poultry Sci. 30:* 240-248. 1951.—Plasma albumin, globulin and total proteins, and, in some cases, blood volume and hematocrit were detd. on adult White Leghorn males and on laying and non-laying females under varying conditions. Time of ovulation, laying and position of the egg in the oviduct had no significant effect on plasma proteins. The total plasma proteins of different groups of laying females ranges from 4.33 g./100 ml. to 5.32. One group of non-layers averaged 5.34. The A/G ratio of laying birds ranged from 0.83 to 0.93, and for the non-layers 0.6. The proteins of the males (4 gm./100 ml.) was significantly lower than those of the females and the A/G ratio was 0.7. Between the hours of 9 a.m. and 4 p.m. there is no true variation in plasma proteins of laying hens. When successive samples per day on the same bird are taken, 2d or 3rd samples always show about

a 5% decrease in plasma proteins over the 1st sample, regardless of the time of day when the samples are taken. This decrease in plasma proteins was shown to be due to hemodilution and an increase in plasma volume. The increase in plasma volume of the 2d sample was about 10%. Also, there was a decrease in hematocrit. Actually, when the plasma proteins are calculated in the basis of adjusted total circulating proteins, it is found that there is a slight increase in the synthesis of plasma proteins but not in the formation of the blood corpuscles. —*P. D. Sturkie.* (Biological Abstracts)

STURKIE, PAUL D., and HAROLD S. WEISS. *(Rutgers U., New Brunswick, N. J.)* THE EFFECTS OF SYMPATHOMIMETIC AND PARASYMPATHOMIMETIC DRUGS UPON EGG FORMATION. *Poultry Sci. 29:* 781. 1950.—*An abstract.* (Biological Abstracts)

TABER, ELSIE. *(Med. Coll. State S. Carolina, Charleston.)* ANDROGEN SECRETION IN THE FOWL. *Endocrinology 48:* 6-16. Illus. 1951.—The withdrawal of exogenous gonadotropic stimulation from the single-comb, light-brown Leghorn fowl resulted in regression of the comb, indicating decreased androgen production, and in the reappearance of foamy, lipoid-filled interstitial cells in the testes and in the medulla of the ovaries. Inhibition of secretion of endogenous gonadotropins by estrogen injns. produced similar results. That lack of androgen was not a causal factor for the appearance of these lipoidal cells was shown when injns. of androgen were followed by effects essentially the same as those observed following estrogen treatment. The results of these expts. provide additional evidence that the interstitial cells of the testis and similar cells in the medullary component of the ovary are responsible for androgen production in the single-comb, light-brown Leghorn fowl; and that interstitial cells filled with basophilic granules represent an active secretory phase, while those containing large osmic-staining, lipoidal droplets represent an inactive phase.—*Elsie Taber.* (Biological Abstracts)

WIEGERS, HOWARD L., LESTER J. DRESSEN, and F. E. MUSSEHL. *(U. Nebraska, Lincoln.)* A PROGRESS REPORT ON THE USE OF DILUTED TURKEY SEMEN IN THE ARTIFICIAL INSEMINATION OF TURKEYS. *Poultry Sci. 29:* 784-785. 1950.—*An abstract.* (Biological Abstracts)

WEISS, H. S., and P. D. STURKIE. *(Rutgers U., New Brunswick, N. J.)* AN INDIRECT METHOD FOR DETERMINING BLOOD PRESSURE IN THE FOWL. *Poultry Sci. 29:* 783. 1950.—*An abstract.* (Biological Abstracts)

WESTERMARCK, H., and A. AALTONEN. OM KAPUNERING AV TUPPAR MED STILBESTROL. [CAPONIZATION OF ROOSTERS WITH STILBESTROL.] *Nordisk Veterinarmed. 2:* 405-414. 1950. —Implantation of stilbestrol subcut. in cockerels suppresses libido and secondary sexual characteristics such as size of comb and wattles. The fat content of muscle was increased from 5.8% to 13.1% in Leghorns and 8.5% to 19.6% in R. I. Reds. The liver fat increases. Histologic examination discloses atrophy of tubules in the testes. Caponization by this method is profitable if there is a demand for better quality chickens for slaughter.—*A. G. Karlson.* (Biological Abstracts)

WHEELER, ROBERT S. *(U. Georgia, Athens.)* INCIDENCE OF LYMPHOID AREAS IN THYROID, ADRENAL, PITUITARY, OVARY AND TESTIS OF BROILER CHICKENS. *Poultry Sci. 29:* 784. 1950. *An abstract.* (Biological Abstracts)

WILLIAMS, C., and GEORGE F. GODFREY. *(Oklahoma A. and M. Coll., Stillwater.)* THE RELATIVE PERCENT THE CHICK IS OF ITS ORIGINAL EGG WEIGHT AS AN INDICATION OF EARLY POST-EMBRYONIC GROWTH. *Poultry Sci. 29:* 785. 1950.—*An abstract.* (Biological Abstracts)

NUTRITION

ALFONSO, JR. PABLO J. *(University of the Philippines, College of Agriculture, Los Banos, Laguna).* "MANAMAR" AS A PROTEIN SUPPLEMENT IN RATIONS FOR GROWING CHICKS. *Philippine Agriculturist. 34:* 90-95. 1950.—"Manamar," an imported commercial feed, is said to be a good animal feed because it possesses all the elements essential for growth and development. When the usefulness of this product as a protein supplement in rations for growing chicks was studied, it was observed that as much as 50 per cent of the normal amount of either fish meal or shrimp meal in the growing ration may be replaced by an equal amount of "Manamar" and be expected to produce results similar to those of rations containing either fish meal or shrimp meal alone. Chicks fed a ration containing 12.50 parts by weight of either fish meal or shrimp meal and 12.50 parts of "Manamar" grew as fast as those given the College standard chick ration, but those fed the ration containing only 25.00 parts by weight of "Manamar" and no shrimp meal did not develop normally, and the mortality was high. —*F. M. Fronda.*

ALMQUIST, H. J., and J. B. MERRITT. EFFECT OF SOYBEAN ANTITRYPSIN ON EXPERIMENTAL AMINO ACID DEFICIENCY IN THE CHICK. *Archives of Biochemistry and Biophysics 31:* 450. May 1951.—The well-known improvement in nutritive value of raw soybean protein on heating or methionine supplementation has been reproduced in chick diets containing the soybean antitrypsin, but deficient in lysine, arginine, or isoleucine, by heating to destroy the antitrypsin or by adding the particular amino acid inadequately supplied in the diet. The mechanism of this effect has been shown to be a general one and probably applicable to any indispensable amino acid. (Experiment Station Record)

ALMQUIST, H. J., and J. B. MERRITT. EFFECT OF SOYBEAN TRYPTIC INHIBITOR ON EXPERIMENTAL ARGININE DEFICIENCY IN THE CHICK. *Archives of Biochemistry and Biophysics 31:* 454. May 1951.—It is evident that the marginal level of arginine in the diet was rendered in effect deficient by the presence of the inhibitors in the raw soybeans. This induced deficiency was corrected either by heating the soybeans to destroy the inhibitors or by adding arginine. The completely supplemented protein was not affected by the inhibitors in raw soybean. Since the last two listed diets gave equivalent growth, the raw soybeans must have been utilized efficiently, and there is no evidence of low availability of any nutrient of the raw soybean. (Experiment Station Record)

BERG, LAWRENCE R., GORDON E. BEARSE *(Washington State Coll., Puyallup),* JAMES McGINNIS *(Washington State Coll., Pullman),* and V. L. MILLER. *(Washington State Coll., Puyallup.)* THE EFFECT OF REMOVING SUPPLEMENTAL AUREOMYCIN FROM THE RATION ON THE SUBSEQUENT GROWTH OF CHICKS. *Arch. Biochem. 29:* 404-407. 1950.—Removal from the ration of 4 week old chicks of supplemental aureomycin, which has been fed either as aureomycin fermentation animal protein factor (APF) or aureomycin HCl, resulted in an immediate cessation of the accelerated growth rate which had existed during the earlier period (0 to 4 weeks).—*Authors* (Biological Abstracts)

BORCHERS, R., and C. W. ACKERSON. *(Univ. of Nebraska.)* THE NUTRITIVE VALUE OF LEGUME SEEDS.—X. EFFECT OF AUTOCLAVING AND THE TRYPSIN INHIBITOR TEST FOR 17 SPECIES. *Jour. Nutr. 41:* 339, June 1950.—The seeds of 11 species of legumes were fed, raw and autoclaved, to rats as the sole source of protein at a 12% protein level. The jack bean, lentil, velvet bean, horse bean, and blackeyed pea were improved by autoclaving, while the pea-

nut, partridge pea, guar, lespedeza, mung bean, and common vetch were not improved. Of a total of 17 species of legume seeds investigated in this and other studies, as listed in table 2, 8 were reported to be improved by autoclaving while 9 were not. No correlation was observed between the effect of autoclaving on nutritive value and the presence or absence of the trypsin inhibitor in the raw legume seed. (Experiment Station Record)

BUCKNER, G. DAVIS, W. M. INSKO, JR., AMANDA HARMS HENRY and ELIZABETH FAULL WACHS. *(U. of Kentucky, Lexington.)* INFLUENCE OF VITAMIN D ON THE GROWTH OF NEW HAMPSHIRE COCKERELS, THEIR COMBS, WATTLES, GONADS, AND UROPYGEAL GLANDS. *Poultry Sci. 30:* 267-268. 1951.—3 lots of battery-raised New Hampshire cockerels were fed ad libitum a basal all-mash ration deficient only in vit. D. Lot 1 received the low vit. D ration; while lots 2 and 3 received the same rations supplemented, respectively, with the optimum and 10 times the optimum quantity of a vit. D concentrate. At ages of 6, 10, 14, and 18 weeks, combs, wattles gonads, and uropygeal gland were removed and measured. The wt. and linear dimensions of the combs, wattles, and gonads increased consistently from the 16th to the 18th week in lots 2 and 3, being larger in lot 3. Growth and general health conditions of the cockerels in lots 2 and 3 were approx. the same during this expt.—*G. D. Buckner.* (Biological Abstracts)

BUHS, R. P., E. G. NEWSTEAD, and N. R. TRENNER. AN ANALOG OF VITAMIN B_{12}. *Science 113:* 625. June 1, 1951.—We have found it possible to prepare the thiocyanate analog of vitamin B_{12} in which the cyanide ion of vitamin B_{12} is replaced by the thiocyanate ion. As was expected, this new analog of vitamin B_{12} is fully active biologically, thus further multiplying the number of known bioactive forms of vitamin B_{12}. (Experiment Station Record)

COATES, M. E., G. F. HARRISON, S. K. KON, M. E. MANN, and C. D. ROSE. *(U. Reading, Eng.)* EFFECT OF ANTIBIOTICS AND VITAMIN B_{12} ON THE GROWTH OF NORMAL AND "ANIMAL PROTEIN FACTOR" DEFICIENT CHICKS. *Biochem. Jour. 48:* xii-xiii. 1951.—Polymixin and nisin were less effective than penicillin, terramycin streptomycin and aureomycin on both groups. (Biological Abstracts)

CONN, J. B., S. L. NORMAN, and T. G. WARTMAN. THE EQUILIBRIUM BETWEEN VITAMIN B_{12} (CYANOCOBALAMIN) AND CYANIDE ION. *Science 113:* 658, June 8, 1951. (Experiment Station Record)

COUCH, J. R., and H. L. GERMAN. *(A. and M. Col. Texas, College Station.)* VITAMIN B_{12} APF CONCENTRATES AND DRIED WHEY IN THE NUTRITION OF THE GROWING CHICK. *Poultry Sci. 29:* 754. 1950.—*An abstract.* (Biological Abstracts)

DINGAYAN, ALFONSO B., and F. M. FRONDA. *(University of the Philippines, College of Agriculture, College, Laguna.)* A COMPARATIVE STUDY OF THE INFLUENCE OF THE LEAVES AND YOUNG SHOOTS OF CENTROSEMA, IPIL-IPIL, AND SWEET POTATO AS GREEN FEED ON THE GROWTH OF CHICKS. *Philippine Agriculturist. 34:* 110-115. 1950.—This is a study conducted from January to November, 1949, to determine the influence of the leaves and young shoots of ipil-ipil, centrosema, and sweet potato as green feed on the rate of growth of chicks. The green feed was finely cut and supplied to the chicks in troughs separate from the mash at the same time in the morning and in the afternoon. As much green feed as the birds could readily consume in about one-half hour was given to the chicks.

The results of the study showed that of the three green feeds tested, ipil-ipil leaves and young shoots produced the heaviest chicks,

followed closely by centro-sema. The chicks given sweet-potato leaves and young shoots were the smallest. They were thus inferior to those that received no green feed at all. The percentage of mortality was highest in the lot fed with sweet-potato leaves and young shoots, the lowest, in the lot fed with ipil-ipil leaves and young shoots.—*F. M. Fronda.*

EVANS, R. J., A. C. GROSCHKE, and H. A. BUTTS. EFFECT OF VITAMIN B_{12} ON PANTOTHENIC ACID METABOLISM IN THE CHICK. *Archives of Biochemistry and Biophysics 31:* 454. May 1951.—In all cases where chicks were fed crystalline vitamin B_{12}, the pantothenic acid content of their livers was much lower than that of livers of chicks fed the basal diet only.

Similar results have been obtained in a later experiment with the indication that chicks which were more deficient in vitamin B_{12} had higher liver pantothenic acid contents.

Our tentative explanation of the data obtained is that vitamin B_{12} aids in the transfer of pantothenic acid from the liver for use elsewhere in the chick's body, and that in the absence of sufficient vitamin B_{12}, pantothenic acid accumulates in the liver. (Experiment Station Record)

GASSNER, F. X., A. R. PATTON, H. S. WILGUS, and L. W. CHARKEY. *(Colorado A. and M. Coll., Ft. Collins.)* FAILURE OF COCKEREL COMB AND TESTIS DEVELOPMENT ON SESAME MEAL AND ITS PREVENTION BY VITAMIN B_{12}. *Proc. Soc. Exptl. Biol. and Med. 75:* 630-633. Illus. 1950.—Feeding single comb White Leghorn cockerels, depleted of vit. B_{12} during the first 2 wks. of life (sodium proteinate basal diet plus 0.05% iodinated casein), from the 2d to the 4th week of age on a 70% sesame meal diet deficient in vit. B_{12} and lysine resulted in failure of morphological differentiation of testicular tissue and a decrease of comb growth. Supplementation with lysine had little corrective effect but added vit. B_{12} (APF supplement Merck No. 3) and lysine produced markedly greater testis growth and differentiation over that in the controls.—*Authors.* (Biological Abstracts)

GROSCHIKE, A. C. *(Michigan State Coll., East Lansing.)* RELATION OF GROWTH STIMULATING PROPERTIES OF ANTIBIOTICS TO UNIDENTIFIED GROWTH FACTORS REQUIRED BY THE CHICK. *Poultry Sci. 29:* 760. 1950.—*An abstract.* (Biological Abstracts)

HALICK, J. V., and J. R. COUCH. *(Texas Agric. Expt. Sta., College Station.)* ANTIBIOTICS IN MATURE FOWL NUTRITION. *Proc. Soc. Exptl. Biol. and Med. 76:* 58-62. 1951.—Hatchability of eggs from birds fed an unsupplemented diet decreased to zero after the 4th wk. Injn. of vit. B_{12} into the hens improved hatchability somewhat. The feeding of aureomycin and penicillin alone apparently assisted in depleting the birds of vit. B_{12} and possibly of the unidentified factor. Liver "L" contained a factor necessary for normal hatchability and embryonic development. The B_{12} content of the egg yolks was detd. by a standard microbiological assay. Injn. of vit. B_{12} and the feeding of an APF concentrate and Liver "L" produced egg yolks that contained approx. the same amts. of vit. B_{12}. Hatchability of eggs from hens fed the practical all-mash diet was about 90% during the test period, but the vit B_{12} content of egg yolks from these birds was lower than that from others injected with vit. B_{12} or fed B_{12} in the form of an APF concentrate or Liver "L."—*Authors.* (Biological Abstracts)

HEUSER, G. F., and M. L. SCOTT. *(Cornell U., Ithaca, N. Y.)* STUDIES IN DUCK NUTRITION. 1. METHODS OF FEEDING. *Poultry Sci. 30:* 161-163. 1951.—Feeding pellets to ducklings resulted in the highest avg. wt. both at 4 and 8 weeks of age. The next best wt. at 4 weeks of age was attained by the birds getting dry mash ad libitum supplemented with 3 wet mash feedings daily. Following these in order were the ducklings being fed dry mash ad libitum, wet mash ad libitum, and wet mash fed 4 times daily.—*G. F. Heuser.* (Biological Abstracts)

DIECKERT, J. W., S. O. BROWN, and J. R. COUCH. *(A. and M. Coll. Texas, College Station.)* A STUDY OF THE EFFECT OF A BIOTIN DEFICIENT DIET ON THE EMBRYONIC DEVELOPMENT OF CHICKS. *Poultry Sci. 29:* 756. 1950.—*An abstract.* (Biological Abstracts)

ELTON L. JOHNSON. *(Iowa State Coll., Ames.)* LATEST ON WONDER DRUGS IN FEEDS. WHAT THEY DO FOR CHICKENS. *Successful Farming 49:* 36-37, 154, 156, 157, 158; 74-75. Illus. 1951.—A report on expts. at the Iowa and Michigan Stations, and elsewhere on feeding hogs crystalline aureomycin, terramycin, penicillin, streptomycin, bacitracin, and polymixin. Figures illustrate how antibiotics may work in the intestine to counteract harmful bacteria. The exptl. use of antibiotics in Iowa chicken flocks is reported covering effects on rate of gain and disease resistance.—*E. M. Young.* (Biological Abstracts)

JUKES, T. H., and E. L. R. STOKSTAD. STUDIES OF VITAMIN B_{12}, CHOLINE AND RELATED FACTORS IN THE DIETS OF CHICKS. *Jour. Nutr. 43:* 459, April 10, 1951.— The results showed that chicks had a comparatively high requirement for dietary choline even when they were well supplied with methionine, glycine, serine, pteroylglutamic acid and vitamin B_{12}. The presence of an inadequate level of choline resulted in the appearance of perosis and the onset of this condition was slower when vitamin B_{12} was not supplied. Betaine had very little effect when fed with suboptimum levels of choline.

No sparing effect of vitamin B_{12} upon the methionine requirement of chicks was noted when a diet was fed which was supplemented with choline, pteroylglutamic acid and other vitamins. (Experiment Station Record)

KRATZER, F. H., and D. E. WILLIAMS. *(U. California, Davis.)* RAISINS FOR TURKEYS. *California Agric. 5:* 13. 1951.—Raisins may replace 30% of the grain or 16% of the whole ration for turkeys in the late growing period without harmful effects on growth and quality.—*G. W. Bohn.* (Biological Abstracts)

KLINE, I. T., R. I. DORFMAN, and P. McCREERY. ESTROGEN STIMULATION OF THE OVIDUCT IN VITAMIN-DEFICIENT CHICKS. *Endocrinology 48:* 345, April 1951.—The inanition which accompanies a state of vitamin deficiency is responsible for a nonspecific, reduced sensitivity of the oviduct to the action of estrogen. When this reduced sensitivity is taken into consideration it is found that estrogen exerts a greater-than-expected stimulation in thiamine-deficient pullets, probably explainable on the basis of greater availability of estrogen because of failure of inactivating mechanisms. (Experiment Station Record)

KRAMKE, E. H., M. D. LLOYD, and J. C. FRITZ. *(Borden Company, Elgin, Ill.)* SOME FACTORS WHICH AFFECT UTILIZATION OF VITAMIN A. *Poultry Sci. 29:* 767-768. 1950.—*An abstract.* (Biological Abstracts)

LEWIS, E. W. JR., C. A. ELVEHJEM, and E. B. HART. STUDIES ON THE NATURE OF THE NUTRITIONAL DEFICIENCIES OF WHEAT GLUTEN MEAL. *Jour. Nutr. 43:* 113. Jan. 10, 1951.—The ability of the chick to utilize the amino acids in wheat gluten has been shown to be correlated with the essential amino acid content of this material. A slight imbalance can be corrected by means of small amounts of supplemental amino acids (lysine, threonine, and tryptophan) in order to bring about optimum growth.

In the course of this investigation it has been demonstrated that the very young chick has a higher growth requirement for methionine relative to the other essential amino acids than does the somewhat larger, older chick. (Experiment Station Record)

McCLYMONT, G. L., D. C. DUNCAN, and S. WILKINS. GRAIN SORGHUM CAN REPLACE WHEAT IN LAYING RATIONS. *Agric. Gaz. N. S. Wales 61:* 656, 665. 1950.—Experiments at the Poultry Expt. Farm, Seven Hills, N. S. Wales have shown that grain sorghum can completely replace wheat in laying rations. Crushed grain sorghum was used as 46.5% of the mash, and as the only grain, and over a full year gave the same production as rations with 46.5% wheatmeal in the mash and wheat as the only grain.—*A. J. Loustalot.* (Biological Abstracts)

McGINNIS, J. ANTIBIOTICS IN FEEDS FOR CHICKS AND POULTS. *Flour & Feed 51:* 7, May 1951.—Procaine penicillin appears to be more effective than terramycin, aureomycin, or bacitracin in promoting chick growth. This is particularly true at the level of 2 grams per ton of feed.

Aureomycin and terramycin appear to be approximately equivalent in value for chick growth. A level of 2 grams of these antibiotics per ton of feed was as effective as a 5-gram level. (Experiment Station Record)

McGINNIS, J., L. R. BERG, J. R. STERN, R. A. WILCOX, and G. E. BEARSE. *(State Coll. Washington, Pullman.)* THE EFFECT OF AUREOMYCIN AND STREPTOMYCIN ON GROWTH OF CHICKS AND TURKEY POULTS. *Poultry Sci. 29:* 771. 1950.—*An abstract.* (Biological Abstracts)

MARCH, B., JACOB BIELY, and J. TONZETICH. *(U. British Columbia, Vancouver, Canada.)* SUPPLEMENTATION OF WHEAT WITH AMINO ACIDS IN THE DIET OF THE CHICK. *Jour. Nutrition 42:* 565-575. 1950.—Lysine added to all-wheat rations adequately supplied with vitamins and minerals increased growth rate and feed efficiency of the chicks, whereas the addition of methionine or tryptophan decreased feed efficiency without affecting growth rate. Addition of lysine up to the optimum required for growth resulted in decreased N content of the feces. Addition of methionine or tryptophan increased the fecal N content. The effect of amino acid imbalance on chick growth was demonstrated with practical rations containing wheat samples of different protein content. Wheat of high protein content (16.5%), when supplemented with fish meal in rations containing 17 to 21% protein, gave lower growth rates and feed efficiency than wheat of avg. protein content (11-23%) similarly supplemented.—*Auth. (courtesy Wistar Bibl. Serv.).*

MENGE, H., R. E. MORENG, and G. F. COMBS. *(U. Maryland, College Park.)* EFFECT OF YOLK REMOVAL IN DAY-OLD CHICKS ON EARLY NUTRITIONAL REQUIREMENTS. *Proc. Soc. Exptl. Biol. and Med. 76:* 46-49. 1951.—An operative technic for removal of the yolk from day-old chicks is descr. Observations on the growth rate of "deutectomized" chicks as compared with that of unoperated controls show that the operation had little or no effect on growth when an adequately supplemented diet was supplied. These results demonstrate that vitamin B_{12} activity is present in the yolk of the day-old chick and that its removal by deuectomy increases the dietary requirement for vtiamin B_{12}.—*G. F. Combs.* (Biological Abstracts)

MILLIGAN, J. L., and H. R. BIRD. *(United States Dept. Agric., Beltsville, Md.)* COTTONSEED MEAL PROCESSING VARIANTS AND CHICK GROWTH. *Poultry Sci. 29:* 771. 1950.—*An abstract.* (Biological Abstracts)

OLESON, J. J., B. L. HUTCHINGS, and A. R. WHITEHILL. *(American Cyanamid Co., Pearl River, N.Y.)* THE EFFECT OF FEEDING AUREOMYCIN ON THE APF REQUIREMENTS OF THE CHICK. *Poultry Sci. 29:* 774. 1950.—*An abstract.*

OLESON, J. J., B. L. HUTCHINGS, and A. R. WHITEHILL. *(American Cyanamid Co., Pearl River, N.Y.)* THE EFFECT OF FEEDING AUREOMYCIN ON THE VITAMIN B_{12} REQUIREMENT OF THE CHICK. *Arch. Biochem. 29:* 334-338. 1950.—The feeding of 25 mg. of crystalline aureomycin HCl per kg. of diet markedly stimulated the growth of chicks fed a corn-soybean meal diet supplemented with graded levels of vit. B_{12}. The antibiotic feeding reduced the apparent vit. B_{12} requirement of the chick. The presence of a minimal amt. of the vit. was necessary to obtain a growth response with the aureomycin. The growth of rats was also stimulated by the inclusion of small amts. of aureomycin or other antibiotics in the diet.—*J. J. Oleson.* (Biological Abstracts)

PEELER, H. T., H. YACOWITZ, C. W. CARLSON, R. F. MILLER, L. C. NORRIS, and G. F. HEUSER. STUDIES ON THE VITAMIN B_{12} CONTENT OF FEEDSTUFFS AND OTHER MATERIALS. *Jour. Nutr. 43:* 49. January 10, 1951.—Evidence is presented that comparable values for vitamin B_{12} potency are obtained by chick growth and microbiological assays.

Using the rapid microbiological assay method and the alkali correction procedure, a study of the vitamin B_{12} content of feedstuffs and other materials was made. Fish meal and related products and liver products were found to contain appreciable quantities of vitamin B_{12}, while cereals and their by-products were found to contain very little, if any, vitamin B_{12}. (Experiment Station Record)

PETERSON, D. W. *(U. California, Berkeley.)* EFFECT OF STEROLS ON THE GROWTH OF CHICKS FED HIGH ALFALFA DIETS OR A DIET CONTAINING QUILLAJA SAPONIN. *Jour. Nutrition 42:* 597-607. 1950.—Growth depression produced in chicks by feeding a 20% alfalfa diet was completely prevented by adding a mixture of cholesterol and cottonseed oil or a mixture of soybean sterols and cottonseed oil to the diet. Although plasma levels of cholesterol could be correlated with growth on the alfalfa diets containing added cholesterol, there was no increase in plasma sterols on the diets containing added phytosterols. Treatment with diethylstilbestrol markedly increased plasma cholesterol but did not prevent growth depression on the alfalfa diet. The growth depression caused by the addition of *Quillaja* saponin to the diet was also completely prevented by the addition of cholesterol and cottonseed oil to this ration.—*Auth. (courtesy Wistar Bibl. Serv.).*

PETERSON, D. W. *(Univ. of California.)* SOME PROPERTIES OF A FACTOR IN ALFALFA MEAL CAUSING DEPRESSION OF GROWTH IN CHICKS. *Jour. Biological Chem. 183:* 647, April 1950. —Concentrates which depressed the growth of chicks were obtained by fractionating a hot water extract of alfalfa meal.

The growth-depressing action of this material was to a great extent counteracted by simultaneous feeding with cholesterol.

The hemolytic properties, together with the observed foaming action, strongly suggest that the material involved is a saponin. (Experiment Station Record)

PLATT, C. S. *(New Jersey Agric. Expt. Sta., New Brunswick.)* A STUDY OF THE COMPOSITION OF MINERAL MIXTURES FOR PIGEONS. *Poultry Sci. 30:* 196-198. 1951.—White King pigeons were kept for 18 months on various combinations of materials commonly found in pigeon grits. Use of oyster shell alone as a supplement to a standard grain mixture resulted in a lowering of squab wt. and production. A combination of oyster shell, charcoal and salt proved satisfactory as a complete grit. Adding materials such as powdered gentian, Venetian red, anise seed, sulfur, bone meal, limestone flour and granite apparently had no significant effect. The percentages of broken eggs, infertile eggs, dead embryos and dead squabs varied in the respective pens but no significance could be attached to the differences noted.—*C. S. Platt.* (Biological Abstracts)

REED, J. R. JR., R. L. ATKINSON, and J. R. COUCH. *(Texas Agr. Expt. Sta.)* DRIED WHEY AS A SOURCE OF UNIDENTIFIED FACTORS FOR THE GROWING CHICK. *Jour. Nutr. 43:* 501, April 10, 1951.—Four experiments were carried out in which 3 to 5% dried whey was added to an all-vegetable protein (corn-soybean oil meal) diet. The feeding of this product produced an increase in the weights of the birds in all instances, even when fed with an APF concentrate containing aureomycin or with penicillin. In agreement with earlier reports, this work indicates that dried whey contains unidentified factors which are necessary for maximum chick growth. (Experiment Station Record)

REISER, RAYMOND. *(Texas Agric. Expt. Sta., College Station.)* THE ESSENTIAL ROLE OF FATTY ACIDS IN RATIONS FOR GROWING CHICKS. *Jour. Nutrition 42:* 319-323. Illus. 1950.—White Leghorn cockerels were fed a basal fat-free ration alone or supplemented with cottonseed oil, lard, recrystallized bayberry tallow or methyl palmitate. The basal ration consisted of 52.8% sucrose, 35.0% soybean protein, 4.0% liver "L" and 5% salts and was supplemented with methionine, glycine, and crystalline water- and fat-soluble vitamins. In 6 trials with no fat, and in one trial each with bayberry tallow or methyl palmitate, the chicks grew at a pronouncedly slower rate than those on a stock ration or on the basal ration plus lard or cottonseed oil.—*Auth. (courtesy Wistar Bibl. Serv.).*

REISER, RAYMOND. *(Texas Agric. Exp. Sta., College Station.)* THE METABOLISM OF POLYUNSATURATED FATTY ACIDS IN GROWING CHICKS. *Jour. Nutrition 42:* 325-336. 1950.—Day-old White Leghorn or crossbreed (Single Comb White Leghorn females x New Hampshire males) cockerels were fed a fat-free ration as such or supplemented with 2% recrystallized bayberry tallow, cottonseed oil, triolein, ethyl linoleate, a mixture of ethyl linoleate and ethyl linolenate, or cod liver oil. Spectrophotometric analyses of the fatty acids of the acetone soluble and insoluble lipids showed that: (1) On a fat-free ration the organ lipids of growing chicks retain the higher polyunsaturated fatty acids more tenaciously than carcass lipids, and phospholipids more tenaciously than neutral fat. (2) Growing chicks convert dienoic acid to tetraenoic and pentaenoic and trienoic acid to hexaenoic acid. (3) The higher polyunsaturated fatty acids of cod liver oil are converted to dienoic acid. (4) Chicks cannot synthesize dienoic or trienoic acid, but produce their higher polyunsaturated acids from these.—*Auth. (courtesy Wistar Bibl. Serv.).*

ROBERTSON, E. I. *(Cornell U., Ithaca, N.Y.)* THE EFFECT OF DIGESTIBILITY ON POULTRY PRODUCTION. *Feedstuffs 20:* 20-21. 1948.—Poultry compare quite favorably with ruminants in ability to digest all nutrients except fiber. Inability of poultry to digest fiber appears to be caused by their high body temp., the rapidity of digestion and the acid reaction of the crop. Volume per pound is an important consideration in formulating feeds for poultry.—*H. L. Wilcke.* (Biological Abstracts)

ROSENBERG, M. M., and A. L. PALAFOX. THE EFFECT OF CREEPING INDIGO (INDIGOFERA ENDECAPHYLLA) ON LAYING CHICKENS. *World's Poultry Science Jour. 7:* 9, January-March, 1951.—Creeping indigo leaf meal adversely depressed egg production, body weight, and feed consumption of laying birds when quantities of 1.25 to 5.0 percent were fed. Pullets raised on a diet containing 5 percent creeping indigo meal were not as sensitive to the toxic principle in the meal and did not cease production within 11 weeks.

It is suggested that the toxic principle contained in the strain of *Indigofera endecaphylla* tested in this study can be transmitted through the hatching egg. (Experiment Station Record)

SCHLAMB, K. F., and R. L. BRYANT. *(North Dakota Agric. Expt. Sta., Fargo.)* SKIM MILK AND GRAIN FOR LAYING HENS. *Bimo. Bull. N. Dakota Agric. Expt. Sta. 13:* 104-106. 1951.—Production and feed efficiency, mortality, increase in body wt., and the fertility and hatchability of eggs were studied with respect to diets of several breeds of hens. A ration of skim milk and mixed grains plus cod liver oil compared favorably with a ration of laying and breeding mash and mixed grains.—*J. F. Reed.* (Biological Abstracts)

SCOTT, M. L., and G. F. HEUSER. *(Cornell U., Ithaca, N. Y.)* STUDIES IN DUCK NUTRITION. 2. STUDIES OF PROTEIN AND UNIDENTIFIED VITAMIN REQUIREMENTS. *Poultry Sci. 30:* 164-167. 1951.—Though White Pekin ducklings produced satisfactory gains to 8 weeks of age on a ration containing approx. 15% of protein, the avg. wts. at 2 weeks of age indicate a slight advantage in early growth for rations containing 17% or more of protein. The results show that both yeast and dried skimmilk contain a factor or factors of importance in the nutrition of ducklings. Addition of either of these supplements to the diet containing 4% or more of fish meal caused a marked increase in growth and feed efficiency. Addition of either 4 or 8% of fish meal was not advantageous unless the diets also contained dried skimmilk or dried brewers' yeast, or both.—*M. L. Scott.* (Biological Abstracts)

SIEBURTH, J. McN., JOSE GUTIERREZ, JAMES McGINNIS, JOEL R. STERN, and B. H. SCHNEIDER. *(Washington State Coll., Pullman.)* EFFECT OF ANTIBIOTICS ON INTESTINAL MICROFLORA AND ON GROWTH OF TURKEYS AND PIGS. *Proc. Soc. Exptl. Biol. and Med. 76:* 15-18. 1951.—Tests were conducted to correlate the growth stimulation of penicillin and terramycin and their effects on the intestinal microflora in turkey poults and young pigs. Growth of turkey poults was consistently improved by addition of the antibiotics alone and together to a basal diet containing no antibiotics. At 2 and at 3 weeks no consistent differences were observed between the control groups and groups receiving antibiotic with respect to total aerobes, total anaerobes, lactose negative rods and enterococci in the cecal contents. However, the genus *Proteus* was found in the birds fed the antibiotics but not in birds fed the basal diet. The count of an organism noted in the cecal contents of birds on the basal diet having characteristics of *Clostridium perfringens* was greatly reduced by the antibiotics in all cases. The organism was observed in very large numbers in the feces of young pigs fed a purified diet. Addition of terramycin greatly reduced the count of this organism and stimulated the growth of the pigs. Possibly the growth stimulating action of the antibiotics could have been due to the inhibition of this toxin-producing organism.—*J. R. Stern.* (Biological Abstracts)

SLINGER, S. J., K. M. GARTLEY, W. F. PEPPER, and D. C. HILL. *(Ontario Agr. Coll.)* THE INFLUENCE OF ANIMAL PROTEIN FACTOR SUPPLEMENTS AND ANTIBIOTICS ON THE INCIDENCE AND SEVERITY OF WHITE FEATHERS IN TURKEYS. *Jour. Nutr. 43:* 345. March 10, 1951.—Groups of birds were fed diets containing 20 and 28% protein with and without penicillin, aureomycin and an APF supplement. The antibiotics and APF supplement resulted in a much greater response in growth and feed efficiency when added to the 28% than to the 20% protein diet. Supplementing the diet containing 20% protein and 1.2% lysine with penicillin, aureomycin or the APF concentrate, resulted in a high incidence of white feathers. (Experiment Station Record)

STERN, JOEL R., and JAMES McGINNIS. *(Poultry Dept., Washington State Coll., Pullman.)* TOXICITY OF GLYCINE FOR VITAMIN B_{12}-DEFICIENT CHICKS. *Proc. Soc. Exptl. Biol. and Med. 76:* 233-234. 1951.—The plasma levels for non-protein N and amino N after admn. of glycine were higher in vit. B_{12}- deficient chicks than in B_{12}-injected chicks. One g. of glycine, when force fed in gelatin capsules,

was toxic to starved, B_{12}-deficient chicks and less toxic to B_{12}-deficient chicks which had not been starved. Chicks which had been injd. with vit. B_{12} were able to withstand the glycine whether or not they had been without food.—*Joel Stern.* (Biological Abstracts)

SUNDE, M. L., W. W. CRAVENS, C. A. ELVEHJEM, and J. G. HALPIN. *(U. Wisconsin, Madison.)* THE EFFECT OF FOLIC ACID ON EMBRYONIC DEVELOPMENT OF THE DOMESTIC FOWL. *Poultry Sci. 29:* 781-782. 1950.—*An abstract.* (Biological Abstracts)

WEST, J. W., C. W. CARRICK, S. M. HAUGE, and E. T. MERTZ. *(Purdue U., Lafayette, Ind.)* THE RELATIONSHIP OF CHOLINE AND CYSTINE TO THE METHIONINE REQUIREMENT OF YOUNG CHICKENS. *Poultry Sci. 29:* 783-784. 1950.—*An abstract.* (Biological Abstracts)

WITZ, W. M., M. M. CARPENTER, and J. W. HAYWARD. *(Archer Daniels Midland Co., Minneapolis, Minn.)* NUTRITIONAL STUDIES WITH RAPESEED MEAL. *Poultry Sci. 29:* 786. 1950.—*An abstract.* (Biological Abstracts)

WOLTERINK, L. F., C. C. LEE, and A. C. GROSCHKE. *(Michigan State Coll., East Lansing.)* THE EFFECT OF A DEFICIENCY OF VITAMIN B_{12} ON IODINE TURNOVER IN THE CHICK THYROID. *Poultry Sci. 29:* 786. 1950.—*An abstract.* (Biological Abstracts)

YACOWITZ, H., L. C. NORRIS, and G. F. HEUSER. *(Cornell U., Ithaca, N. Y.)* EVIDENCE OF INTERRELATIONSHIPS BETWEEN VITAMIN B_{12} AND RIBOFLAVIN, PYRIDOXINE AND PANTOTHENIC ACID. *Poultry Sci. 29:* 787. 1950.—*An abstract.* (Biological Abstracts)

ZACHARIAS, LEONA, PAUL GOLDHABER, and V. EVERETT KINSEY. *(Harvard Med. Sch., Boston.)* VITAMIN E DEFICIENCY IN CHICKS. I. THE EFFECTS OF DIETARY SUPPLEMENTS ON PLASMA TOCOPHEROL LEVELS AND VITAMIN E DEFICIENCY SYMPTOMS. *Jour. Nutrition 42:* 359-373. 1950.—The chief symptom of vit. E deficiency was encephalomalacia; cases of exudative diathesis and of gizzard necrosis were also observed. No ocular abnormalities were found. Deficiency symptoms occurred only when cod liver oil was a constituent of the diet. The plasma-tocopherol levels of chicks fed the alpha-tocopherol-supplemented diets were lowered by the admn. of a water-miscible multiple vit. prepn. (Vi-Penta), cod liver oil, or crystalline vit. A. Fe supplements had no effect. Chicks showing plasma tocopherol levels of approx. 1 mg.% or more never developed symptoms. Chicks having plasma tocopherol levels of approx. 0.5 mg.% or less developed symptoms only when fed certain diets. Chicks did not develop symptoms when fed the vit. E-deficient basal diet supplemented with Vi-Penta, or the natural diet supplemented with 5% cod liver oil. In both these groups cod liver oil was present in the diet and the plasma tocopherol levels were as low as those of chicks receiving the vit. E-deficient basal diet. The absence of symptoms in these groups indicates that there are substances other than vit. E, present in the natural diet and in Vi-Penta, which protect chicks from vit. E deficiency symptoms. The protective factor in Vi-Penta was found to be ascorbic acid.—*Auth. (courtesy Wistar Bibl. Serv.).*

POULTRY MASHES WITH FOUR LEVELS OF VITAMIN OIL COMPARED. *Twelfth Progress Report (1947) for University of Alaska.* p. 19.—

1. Higher than average vitamin D requirements are indicated for laying hens under Alaskan conditions.
2. Laying hens, especially inherently high producers, respond to a higher vitamin D allowance as indicated by higher egg production, higher quality egg shell, and more efficient use of feed.

3. Under Alaska conditions, pullets require between 300 to 400 AOAC units of vitamin D per 100 grams of total diet for most efficient production.

4. Pullets require 300 AOAC units of vitamin D per 100 grams of total diet for the production of satisfactory egg shells over a period of high egg production in Alaska. (Experiment Station Record)

SUNFLOWER SEED PROTEINS. *Bimonthly Bulletin of North Dakota Agr. Exp. Sta. 13:* 175. March-April 1951.—Experimental work at the University of California showed that sunflower seed meal as a supplement to laying mash was equally as effective as heat treated soybean meal from the standpoint of average egg production and mortality in the flock. (Experiment Station Record)

VITAMIN B_{12} NEEDS OF POULTRY. *Flour & Feed 51:* 5, May 1951.—Requirements reported to date are as follows:

1. Merck Laboratories .....24 mg. per ton
2. Minnesota .....10 mg. per ton
3. U.S.D.A. .....14-20 mg. per ton
4. Wisconsin .....14 mg. per ton
5. Lederle Laboratories .....14 mg. per ton
6. Cornell .....2.2 to 4.5 mg. per ton

Work conducted at Washington State College in which various levels of vitamin B_{12} were fed in the presence of antibiotics showed that 8 micrograms of B_{12} per kilogram or 7.25 milligrams per ton of mash were needed for maximum growth. Two per cent herring meal was as effective as this level of B_{12}. (Experiment Station Record)

PATHOLOGY

BEARD, W. A. BLUE COMB. *North Am. Vet. 32:* 402. June 1951.—One of the outstanding features of blue comb is the drastic drop in feed consumption on the day preceding the appearance of the first symptoms. The first actual symptom will be listlessness. There is no appetite and the legs shrivel very quickly. This shriveling of the legs is due to extreme dehydration. A white, watery diarrhea appears early and, as the name indicates, there is usully cyanosis of the comb. Since dehydration is the outstanding symptom, it would seem logical to apply your efforts toward overcoming it. Potassium salts seem to be the answer. Blackstrap molasses has long been a favored remedy and it is probably the potassium that occurs naturally in molasses that is responsible for its effectiveness. (Experiment Station Record)

BONEY, W. A. JR. A STUDY OF SULFAQUINOXALINE AND SULFAMETHAZINE IN FOWL TYPHOID AMONG BREEDER TURKEYS. *Am. Jour. Vet. Res. 12:* 134. April 1951.—Periodic tests revealed that neither sulfaquinoxaline nor sulfamethazine prevented further spread of the disease in the infected flocks. (Experiment Station Record)

McGREGOR, J. K. *(Ontario Agr. Coll.)* 2-AMINO-5-NITROTHIAZOLE IN THE CONTROL OF ENTEROHEPATITIS (BLACKHEAD) IN TURKEYS. *Jour. A.V.M.A. 118:* 394, June 1951.—ANT in the 0.05 percent concentration in the feed possessed prophylactic action against blackhead only while it was administered continually in the feed. There was no indication that the drug was stored in the tissues of treated birds for any appreciable time after medication was withdrawn. (Experiment Station Record)

VAN ROEKEL, H., M. K. CLARKE, K. L. BULLIS, O. M. OLESIUK, F. G. SPERLING. *(Massachusetts Univ.)* INFECTIOUS BRONCHITIS. *Am. Jour. Vet. Res. 12:* 140. April 1951.—The disease is highly

contagious and spreads with great rapidity.

The course of the disease is relatively short, the majority of birds exhibiting symptoms from one to eleven days after exposure.

Losses from the disease in laying flocks may approximate $1 per bird, as the result of decreased egg production and abnormal egg quality.

A program of artificial exposure of young birds to an infective virus has enabled flockowners to immunize their flocks, thus affording protection against the disease during the productive period of the flock. (Experiment Station Record)

POULTRY PRODUCTS AND MARKETING

ALEXANDER, LUCY M., GRACE E. SCHOPMEYER, JESSIE C. LAMB, and STANLEY J. MARSDEN. *(Agric. Res. Admin., U. S. Dept. Agric., Washington, D. C.)* YIELD OF COOKED EDIBLE PORTION OF TURKEY ACCORDING TO SEX, AGE, FATNESS, AND TYPE. *Poultry Sci. 30:* 187-195. 1951.—73 turkeys representing Beltsville Small White, Broad Breasted Bronze, Bourbon Red, and Slate vars., and 5 crosses, ranged in age from 8 to 289 wks., in breast type from grade 9 (narrow minus) to grade 2 (broad), and in fatness increasing in degree from grade 9 to grade 1. Cooking methods included roasting, oven braising, simmering, and steaming with and without pressure. Data on cooking time and shrinkage are presented. Largest yields of cooked muscle (excluding neck and giblets), 38.5-41.9% of N.Y. dressed wt., were obtained from roasted males and females 26-30 wks. old, graded 5 (medium) to 2 (broad) in breast type, and 6 to 3 in fatness. Beyond the usual market age, males (39-56 wks.) yielded 12% of skin with adhering fat, or double that of the females (37-57 wks.), showing a striking sex difference not found in younger turkeys.—*L. M. Alexander.* (Biological Abstracts)

BAKER, RALPH L., and RICHARD H. FORSYTHE. *(Iowa State Coll., Ames.)* U. S. STANDARDS FOR QUALITY OF INDIVIDUAL SHELL EGGS AND THE RELATIONSHIPS BETWEEN CANDLED APPEARANCE AND MORE OBJECTIVE QUALITY MEASURES. *Poultry Sci. 30:* 269-279. 1951.—A review of literature on relationships between open-egg measurements of egg quality and candling. It is recommended that more adequate definition of shell texture, less emphasis on aircell movement, some term other than clear in describing the white and temp. ranges for grading be incorporated into the U. S. Standards. —*Authors.* (Biological Abstracts)

CARLIN, A. F., and J. C. AYRES. STORAGE STUDIES ON YEAST-FERMENTED DRIED EGG WHITE. *Food Technology 5:* 172. May 1951.—Dried, yeast-fermented egg white produced satisfactory angel cakes immediately after drying. Yeast-fermented egg white is soluble in water, rehydrates readily, and can be used to make high quality angel cakes. This egg white does not have an objectionable "off odor" and retains all the properties of fresh albumen, particularly whipping properties. Further work is being done on the flavor of this product.

After 16 weeks of storage at 22°C. (71°F.) there were no detectable changes in color and angel-cake making properties of yeast-fermented dried egg white. Storage at 40°C. (104°F.) caused some deterioration in this product. (Experiment Station Record)

DE LA TORRE, QUINTIN L., N. B. TABLANTE, and F. M. FRONDA. *(University of the Philippines, College of Agriculture, College, Laguna).* CONSUMERS' PREFERENCES IN THE CITY OF MANILA FOR POULTRY AND POULTRY PRODUCTS. *Philippine Agriculturist 34:* 78-83. 1950.—A survey was undertaken from May, 1949, to March, 1950, of the preferences of consumers in Manila for

poultry and poultry products. Manila was chosen for this study because, being the largest center of consumption in this country and the most accessible from all points, poultry and poultry products from different provinces find their way to its markets in one form or another. The questionnaire method of investigation was used.

The results of the study showed, among other things, the following:

1. Regardless of the family income, 65.45 per cent of the consumers expressed their first preference for chicken eggs and only 14.14 per cent for duck eggs.
2. Manila housewives preferred locally produced fresh, medium-sized, white-shelled eggs.
3. Chickens weighing 1.5 kilos or more each were preferred by Manilla housewives, and three fourths of them would rather buy live birds than other forms.
4. Ducks, turkeys, and squabs were purchased by Manila housewives only occasionally.
5. The public market was the main source of both eggs and poultry. —*F. M. Fronda.*

FORSYTHE, RICHARD H., and DWIGHT H. BERGQUIST. *(Iowa State Coll., Ames.)* THE EFFECT OF PHYSICAL TREATMENTS ON SOME PROPERTIES OF EGG WHITE. *Poultry Sci. 30:* 302-311. 1951. —A method for the microscopic examination of ovomucin fibers utilizing a "wet" mount and dark field illumination is described. The technic results in a minimum of alteration in the egg white. Changes in the microscopic structure of the ovomucin fibers of egg white result from blending (Waring blendor), whipping into a foam, high pressure homogenization, and high speed centrifugation. The latter 2 procedures result in decreased functional performance of the egg white while the 1st increases the beating rate and angel cake volume. Existing analytical procedures for ovomucin are shown to be unsatisfactory. The authors conclude "that the presence of ovomucin, either in native or modified form, is not sufficient to insure satisfactory formation of egg white foams."—*R. H. Forsythe.* (Biological Abstracts)

KLINE, LEO, and T. T. SONODA. *(West Region. Res. Lab., Albany, Calif.)* ROLE OF GLUCOSE IN THE STORAGE DETERIORATION OF WHOLE EGG POWDER. I. REMOVAL OF GLUCOSE FROM WHOLE EGG MELANGE BY YEAST FERMENTATION BEFORE DRYING. *Food Technol. 5:* 90-94. 1951.—Factors requisite to the preparation of an organoleptically acceptable glucose-free whole egg powder by resting-cell yeast fermentation are described. Most measurements were carried out using *Torulopsis monosa* or *Saccharomyces cerevisiae.* However, of 6 strains tested, 2 of *S. cerevisiae* and 1 of *S. carlsbergensis* appeared to be equally desirable combining rapid fermentation rate with minimum residual foreign flavor in the resultant glucose-free powders. Commercially available *S. cerevisiae* (bakers' yeast) was nearly as satisfactory as laboratory-grown strains. The effects of pH, yeast concn., type of yeast and temp. on the process and on quality of product are described. The laboratory process was applied on a commercial scale and proceeded according to predictions. Three lbs. of fresh bakers' yeast was used to ferment 1200 lbs. of whole egg melange in about 3 hours at 25-30°C. The fermented liquid was pasteurized at 142°F. for 3-4 min. and spray-dried to 3.5% moisture. The initial organoleptic quality of the powder was at least as high as a standard powder prepared from the same batch of liquid. The commercial processing reduced the yeastiness to the point where it was not significantly detectable to a trained taste panel. Application of the resting-cell yeast process to egg white and yolk was also illustrated. —*Leo Kline.* (Biological Abstracts)

KLINE, L., J. E. GEGG, and T. T. SONODA. ROLE OF GLUCOSE IN THE STORAGE DETERIORATION OF WHOLE EGG POWDER. —II. A BROWNING REACTION INVOLVING GLUCOSE AND CEPHALIN IN DRIED WHOLE EGGS. *Food Technology 5:* 181. May

1951.—The following changes in the phospholipid fraction which occur during the storage of whole egg powder have been found to be practically eliminated by removal of glucose from the liquid before drying. These are:

1. Visible browning of the total lipid or phospholipid fraction.
2. Development of fluorescence in the total lipid or phospholipid fraction.
3. Increased ultraviolet absorption by the total lipid or phospholipid fraction.
4. Loss in amino nitrogen content of the phospholipid fraction. (Experiment Station Record)

LINEWEAVER, T., J. H. ANDERSON, and H. L. HANSON. PREVENTION OF RANCIDITY DEVELOPMENT IN FROZEN CREAMED TURKEY. *Technical Program and Abstracts, 11th Annual Meeting of the Institute of Food Technologists,* June 17-21, 1951, New York. p. 16, abstract No. 33.—A factor limiting the use of turkey in precooked frozen foods has been the tendency of products containing turkey meat and fat to develop a rancid flavor. In many cases the rancidity can be detected immediately after the product has been prepared, and it increases during frozen storage. During preparation and during storage of frozen creamed turkey, rancidity development is greatly retarded when small amounts of edible antioxidant are present during cooking of the turkey. (Experiment Station Record)

LOGAN, P. P., C. H. HARP, and W. F. DOVE. KEEPING QUALITY OF PRECOOKED FROZEN CHICKEN A LA KING, A BACTERIOLOGICAL EVALUATION OF HOT AND COLD PACKS. *Food Technology 5:* 193. May 1951.—Data on the stability of precooked frozen chicken a la king, adequately processed and carefully handled, under both commercial and simulated military storage, are presented. The process of hot filling followed by quick freezing at 0°F. (-18°C.) assures a virtually sterile product after a storage period of two months, with no significant change in count during a year of storage. The cold-filled product was also shown to be highly satisfactory. However, a somewhat higher bacterial count, ascribed to post-contamination during handling prior to the quick-freeze processing indicated that sanitary handling and speed are essential to manufacture of a wholesome product. Acceptability of both products was initially high and remained substantially unchanged by a year of storage. (Experiment Station Record)

OGILVY, W. S., and JOHN C. AYRES. *(Iowa Agric. Expt. Sta., Amcs.)* POST-MORTEM CHANGES IN STORED MEATS. II. THE EFFECT OF ATMOSPHERE CONTAINING CARBON DIOXIDE IN PROLONGING THE STORAGE LIFE OF CUT-UP CHICKEN. *Food Technol. 5:* 97-102. Illus. 1951.—Pieces of chicken were stored in glass containers in refrigerators. Desired CO_2 levels were maintained by a constant flow of gas or by periodic replacement of atmospheres. In general, storage life of chicken increased at higher CO_2 levels. Storage index (ratio of keeping time in CO_2 to keeping time in air) appeared to be a linear function of CO_2 concn. CO_2 levels higher than approx. 25% led to serious discoloration. The importance of a low initial bacterial load and low holding temp. was demonstrated. Avg. generation time for the slime forming bacteria appeared to be a logarithmic function of both CO_2 concn. (0-25%) and temp. (32°-50°F.). Bacteria principally responsible for slime production on chicken were members of the genera *Pseudomonas* and *Alcaligenes.*—*W. S. Ogilvy.* (Biological Abstracts)

WHERRY, LOUISE L., and GWENDOLYN L. TINKLIN. *(Kansas Agric. Expt. Sta., Manhattan.)* TIME LIMIT IS VITAL IN STORING EGG-TYPE MIX. *Food Indust. 22:* 2061-2062, 2191-2193. 1950.—Cake mixes containing dried whole egg can be stored at room temps. for a max. of only 7 wks. or refrigerated for max. of 20 weeks and still produce acceptable cakes—*R. S. Harris.* (Biological Abstracts)

WINTER, A. R. *(Ohio State Univ.)* WHAT WE KNOW ABOUT EGG CLEANING METHODS. *American Egg & Poultry Review,* April 1951. p 49.—Wet cleaning methods proved more practical than dry ones for cleaning dirty eggs (more than 20% of the shell surface soiled).

Eggs cleaned in warm solutions (100-110°F.) kept better than those cleaned in cold (tap water) solutions.

The use of a combination detergent-germicide in the warm cleaning water resulted in better keeping quality of the eggs than when water alone or with a detergent only was used.

Detergent-germicide mixtures containing a bleaching agent (chlorine) appeared to remove stain better than those without it.

Soaking egs with sound shells in detergent-germicide solutions used for cleaning eggs, for 30 minutes did not affect their taste, odor, pH, beating properties of the white or its value for making angel food cakes.

The keeping properties of cleaned eggs was improved greatly by pasteurization in the shell. This was done by agitating the eggs in a water bath at 144°F. for over two minutes. This heat treatment did not harm the functional properties of the egg white. (Experiment Station Record)

MANAGEMENT

AGLIBUT, A. P., F. M. FRONDA, and T. M. MENDOZA. *(University of the Philippines, College of Agriculture, College, Laguna.)* FLOOR SPACE REQUIREMENTS OF BROILERS RAISED IN BATTERY CAGES. *Philippine Agricultural Engineering Journal, 2:* 21-22. 1951.—This is a paper read before the Agricultural Engineering Convention of the Philippine Society of Agricultural Engineers on March 30, 1951, in Manila. The authors concluded that if all production factors were taken into consideration in broiler production at least 0.6 sq. ft. or 557 sq. cm. of floor space must be allowed each bird of both New Hampshire and S. C. White Leghorn breeds. Although the figures are not statistically significant, the broilers produced where there were more birds in a given area were smaller than those where there were fewer. Also, in both breeds, better quality of broilers was produced where more space was allowed per bird than where there was less. The more crowded the chicks were, the higher was the death rate.—*F. M. Fronda.*

BRANN, V. H. THE USE OF ELECTRIC LIGHTS FOR WINTER LAYING. *The Agri. Gazette of New South Wales.* Vol. 62. Part 2. February 1, 1951. p. 105. (Experiment Station Record)

HALL, J. W. INFRA-RED CHICK BROODING ON VIRGINIA FARMS. *Farm Electrification 5.* 13. March-April, 1951.—Materials to build a 500 chick size brooder:

One piece of 4′ x 6′ one-half inch insulating board
Two pieces of 1″ x 2″ x 10′ strips
Two pieces of 1″ x 2″ x 6′ strips
One brooder thermostat assembly
Six 250 watt heat lamps
Six open wire porcelain sockets
35′ of No. 2-14 Romex wire.

At the age of 3 weeks, this brooder had used 360 kilowatt hours, and Mr. Flora feels that even though it was extremely cold weather, he will be able to complete the brooding at 6 weeks for slightly over 1 kwhr per chick, which he feels is less cost than any other type of brooding that he could have possibly used. This current consumption is rather low for this season of the year for infra-red brooding, and using sacks as curtains around the baffle board during cold weather and while the chicks were small reduced the cost of operation at least 25 percent. (Experiment Station Record)

RICE, W. H. *(Univ. of Maryland.)* POULTRY RANGES IMPROVED BY MOWING. *Extension Service News. 38:* 3. May 1951.—A mowing about mid-May or June 1 and again in July improves the value of the range for poultry. At least two advantages result from the mowing as follows:

1. Weeds are destroyed before going to seed thus giving a purer stand of the forage crops and removing them as harbors for rats and predatory animals.

2. Mowing removes the older growth that has become too tough and is no longer palatable to the birds, thus promoting a new and more palatable growth that furnishes more feed to the birds.

The ideal time for the first mowing is about two weeks before placing young stock on range. (Experiment Station Record)

STEWART, I. J. INFRA-RED BROODING TESTS AT STATE RESEARCH FARM. *Jour. Dept. Agric. Victoria 49:* 9-12. Illus. 1951.—The results of this expt. do not justify a recommendation to farmers to discard their present equipment in favor of infra-red lamps. Current methods appear to be equally satisfactory without the same encouragement of cannibalism, a particular hazard when chicks have to be shut in during bad weather.—*Auth. summ.* (Biological Abstracts)

WILSON, W. O. CHICK SHIPPING BOXES SHOULD KEEP BROODING TEMPERATURE AS CHICKS CAN WITHSTAND CHILLING BETTER THAN OVERHEATING. *California Agriculture 5:* 4, May 1951.—Chicks suffered more from overheating than from chilling. This suggested the use of a larger box during hot weather, to eliminate the excess metabolic heat produced by the chicks.

In some tests the baby chicks were able to remain in a 40°F. room for six hours without suffering serious mortality during the exposure or the week following.

It was shown that oxygen, while reduced slightly below the content of normal air, was still ample to meet the needs of the chicks. Likewise there was an accumulation of carbon dioxide but not in sufficient amounts to be harmful to the chicks.

When the room temperature is below 90°F. it is not necessary to remove more than one or two plugs per compartment; when the room temperature is over 90°F. all plugs may be removed. (Experiment Station Record)

GENERAL

CHRISTENSEN, RAYMOND P., and RONALD L. MIGHELL. COMPETITIVE POSITION OF CHICKEN AND EGG PRODUCTION IN THE UNITED STATES. *Tech. Bull. U. S. Dept. Agric. 1018.* 1-58. 1950.—This bulletin is concerned with prevailing economic questions about the national production and consumption of chicken meat and eggs. Recent trends in production and its distribution of farms are described, and the factors that have been responsible for changes in production and consumption are analyzed. Production of chickens and eggs in the U. S. A. has shown a remarkable expansion in the last 20 yrs. But the most striking circumstance is that this expansion has been even greater than in the case of other livestock products despite lower relative prices. Total production of chickens and eggs increased about 50% from 1925-29 to 1945-49, or about 10% more than the rise in output of other livestock products. Farm prices for eggs and chickens increased also, but less than prices of other livestock items so that, considered on a relative basis, the prices of eggs declined about 10% and chickens about 20%. The large expansion in total livestock production has been attributed to improved production technology and larger supplies of feed and other resources on the one hand, and to expanding demand with population growth and higher incomes on the other. The greater increase

in chicken and egg production, despite lower relative prices, has been mainly due to an even more rapid improvement in poultry-production technology. Total demand expanded somewhat more for eggs than for other livestock products because of large Government purchases and exports in 1945-49. Consumption and expenditures data for foods also suggest that there has been a relative increase in demand for chicken meat. But the increase may be due partly to the change in the character of product with the shift to more commercial broilers. In any event, it is clear that more of the expansion in production of chickens and eggs in the last 20 yrs. can be attributed to conditions affecting supply than to conditions affecting demand.—*R. P. Christensen.* (Biological Abstracts)

HADLINGTON, E. *(Principal Livestock Offices, Poultry).* THE DEVELOPMENT OF THE POULTRY INDUSTRY IN NEW SOUTH WALES. FIFTY YEARS OF PROGRESS. *The Agri. Gazette of New South Wales,* Vol. LXII. Part 3, p. 161, March. 1951. (Experiment Station Record)

PHILIP, BO, GÖSTA LAGERMALM, and NILS GRALEN. *(Swedish Inst. Textile Res., Gothenburg.)* SURFACE STRUCTURE OF FEATHERS FROM THE WHITE DOMESTIC FOWL. *Nature* [*London*] *166:* 1070-1071. Illus. 1950.—After bromination and shaking with water, electron microscopy showed fragments of epicuticle less than 100 Å. thick. Treatment with 50% phenol for 2 hours at 100°C., followed by tryptic digestion, gave a similar but more extensive membrane with a velvety concentration of little angular sacs; and sometimes with striations as though due to bundles of microfibrils. Alcohol and bisulfite gave a thicker (0.1μ) ridged membrane with imprint of cell walls; this corresponds to exocuticle of wool.—*Roland Walker.* (Biological Abstracts)

WILKINS, S. J. MUSCOVY DUCK. *Agric. Gaz. N. S. Wales 61:* 433-438. 1950.—The large increase in the number of ducks raised for table purposes in recent times may be attributed to the firm prices now consistently realized, in place of the variable returns which accompanied the spasmodic seasonal demands of past yrs. Muscovy ducks are more popular than English breeds, and have increased in numbers in most districts. It is the purpose of this article to describe the rearing and feeding of this table bird, the demand for which has been stimulated by the greatly increased export trade in all types of poultry.—*A. J. Loustalot.* (Biological Abstracts)

YORKE, LEO C. THE EGG-FEED RATIO—A GUIDE TO THE PROFITABILITY OF POULTRY FARMING. *Agric. Gaz. N. S. Wales 61:* 618-622. 1950.—The cost of feed constitutes the main expense item of the poultry farmer. The amt. of these costs in relation to the returns the producer receives for his eggs therefore provides the major criterion by which he assesses the profitability of his egg enterprise. This relationship, usually referred to as the egg-feed ratio, is also useful in determining whether the economic position of the egg industry generally is improving or deteriorating. The present article discusses the application of egg-feed ratios to local conditions.—*A. J. Loustalot.* (Biological Abstracts)

Note:

The Experiment Station Record, published by the Office of Experiment Stations, United States Department of Agriculture, was discontinued as a publication several years ago. Ref rences to "Experiment Station Record" in some of the items of this abstract material, therefore, refer not to the publication of this name but to the records kept by the Office of Experiment Stations.

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Ministry of Agr. & Fisheries, The Secretary, 1-3 St. Andrews Place, Regents Park, London, N.W.

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Western Australia Poultry Science Ass'n., Major G. D. Shaw, Sec., Leake St., Belmont, Western Australia.

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Danmarks Fjerkraevlerforening, Sortedamsdossering 27, Copenhagen.

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The Accredited Poultry Breeders Fed. of England & Wales, Ltd., F. Long, Sec., 243 Gray's Inn Road, London W.C. 1.

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The Poultry Association of Great Britain Ltd., Wigton House 206-212 St. John Street, Clerkenwell, London EC 1.

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C. A. Corselis, Editor, Poultry, P.O. Box 9, Haymarket, Sydney.
Dept. of Agr. & Stock, William St., Brisbane, Queensland.
E. Hadlington, Dept. of Agr., Farrer Place, Sydney, New South Wales.
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Poultry Farmers Cooperative Society, Box No. 743K, G.P.O., Brisbane.
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R. Willems, Recherches Veterinaire, rue Groeselenberg, Uccle.

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J. Baelum, Agr. Research Lab., Rolighedsvej 25, Copenhagen V.
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Anthony Buxton, Poultry Research Sta., Houghton Grange, Houghton, Hunts.
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Mrs. Doris Inglis, Nat'l Agric. Advisory Serv., 106 London Road, King's Lynn.
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Miss M. M. Wright, Nat'l Inst. Poultry Husbandry, Newport, Shropshire.

FINLAND

Esko Alavuo, Finland's Poul. Breeders Assn., Siipikarjanhoitajain Liitto r.y., Puh 2690, Hameenlinna.
Erkki Tiitola, Kaivanto.
H. Westermarck, St. Allen 1, Munksnas.
N. Westermarck, St. Allen 1, Munksnas.

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Societe Totaliment, M. Best, 146 Blvd. de Paris, Marseille (Bouches du Rhone).
M. Thiery, 4 bis Rue Michel Charles, Paris.
Maurice Tobler, Dancourt, par Nogent le Roi (Eure et Loir) France.
G. Visser, 355 Bd. Gambetta a Tourgoing, (Nord).
Paul Waroquiez, 12 rue d'Armaille, Paris 17.
M. Alex Wiltzer, 28 Rue Bonaparte, Paris 6.

GERMANY

W. Bremer, Lerchenfeldstr. 28, Munchen.
Dr. V. Burgsdorff, Garath b. Benrath/Rh.
P. Collignon, Sandstrasse Bonn a. Rhein.
Chinosolfabrik, Aktiengesellschaft, Billbrookdeich 42, Hamburg 48.
K. Ehlers, Volsemenhusen bei Marne i. Ditmarschen.
J. Eickel, Saarlandstra. 28, Hamm (Westf.)
H. Engel, Hamburg-Lohbrugge III, Lohbruggerhohe.
Dr. R. Fangauf, Steenbeker Weg 151, Kiel-Wik.
E. Fetzer, Geislingen.
H. Freyer, Kirchbachstr. 97, Bremen.
O. Garlichs, Koblenzer Strasse 176, Bonn.
Geflügel-Borse, Westdeutsche Ausgabe, S. Jurgens-Verbag, Hohenzollernstra. 158, München 13.
Dr. Peter Grüter, Düsseldorf, Rosstrasse 135.
Bernh Grzimek, Friedbergeranlage 16, Frankfort/Main.
B. Haneberg, Regierungsamtmann, Gartnerstrasse 34/1, Munchen 54.
Heino Hass, Landwehr über Overath.
Prof. Havermann, Lassestra. 6, Bonn a. Rhein.
Gotthilf Heerman, Ausserhalb 5, Muhlacker/Württemberg.
Inst. für Tierz. u. Milchwirt, Universität Göttingen, Nikolausberger Weg 13, Göttingen.
Dr. Kautz, Geflügelhof "Alt-Wurttemberg", Ludwigsburg, Am. Kugelberg.
G. Keppler, Elisenweg 20, Pfullingen.
Karl Kluthe, Geflügelhof Schomberg, Am. Krahenort 27, Lunen-Gahmen.
Dr. Koch, Anstalt für Kleintierzucht, Dornbergstrasse 25-27, Celle b. Hannover.
Anton Lag, Geflügelholf, Inning/am Ammersee.
E. Mangold, Laubacher Str. 21, Berlin-Friedenan.
Dr. Mantel, Erding/Oberbayern, Schliessfach 30.
Dr. Mehner, Inst. für Tierzuchtlehre, Stutgart-Hohenheim.
Miss Elisabeth Mielck, Hohenkamp 6, Geesthacht bei Hamburg.
Rotraut Müller, Ofr. Kirchplatz 2, Hochstadt/Aisch.
F. Pfenningstorff, Herwathstrasse 3, Berlin-Lichterfelde. (Am. Sector.)
Richard R. Römer, (27b) Arzbach bei Bad Ems, Forstrasse 32a.
Wilhelm Salzwedel, Hauckstrasse 7, Wiltenberg/a. Main.
Irm. Sassenhoff, Veterinarstr. 6, München 22.
H. Schafer, Reichensachserstr. 20, Eschwege.

Landw. Rat Schlütter, Lehr-und Versuchsanstalt fur Geflügelund Kleintierzucht, Krefeld-Grosshuttenhof.
E. Schurmann, Bonn-a-Rhein, Poppelsdorfer Allee 48.
Fritz Steinhoff, Nutzgeflügelhof, Bucholzer Kirchweg 70, Hannover-Buchhols.
J. Stucht, Bork i. Westfalen.
K. Wagener, Misburger Damm 16, Hannover.
W. Ziebertz, Kaiser-Friedrichstrasse 249, Duisburg-Hamborn.
H. Zipf, Nürnberger Str. 85, Fürth/Bavaria.
W. Zorn, Landesforschungsantalt für Tierzucht, Grub bei München (Amerik Zone).

HAWAII

Chas. M. Bice, University of Hawaii, Honolulu 14, T.H.

HOLLAND

H. Adams, Arnhemsweg, Beekbergen.
M. van Albada, Konigsweg 31, Beekbergen.
B. van Asperen Vervenne, Thorbeckeslaan 337, The Hague.
L. De Blieck, Sostdijker Straatweg 113 N, Bilthoven.
K. Bos, Jacob Catslaan 39, Amersfoort.
P. J. Bremer, Ons Doelstraat 24, Boxtel.
A. Clarenburg, Rijksinstituut v.d. Volkegezondheid, Sterrenbos 1, Utrecht.
F. A. De Lange, Harderwijkerweg 142, Ermelo.
H. M. K. Frings, Dorpsstraat 105, Beekbergen.
E. H. de Groot, Chem. fabriek, "Noord-Holland", Beverwijk.
J. Grashuis, "De Schothorst," Hoogland.
P. Hardus, Leraar R. K., Landbouwinterschool, Raalte.
J. J. Hendrikse, Emmaweg 2, Maarsen.
B. J. C. teHennepe, Sportlaan 102, The Hague.
K. von Henning, Fabriek van Pluimveevoeder, 't Heidenhuis, Wezep.
W. K. Hirschfeld, Zootechnisch Inst., Bilstr. 172, Utrecht.
J. Hoogendoorn, Zuideninde 39, Meppel.
J. J. Janssen, Villapark 4, Venlo.
J. van Julsingha, v. Noordtkade 20, Amsterdam.
H. G. Kok, Taalstraat 20, Vught.
J. G. Konings, Oirschotlaan 25, Zeist.
H. Koudijs, "De Cotelaar," Barneveld.
W. Koudijs, Kooterweg 70, Barneveld.
M. Leverland, Arnchemscheweg 598, Beekbergen.
O. Meijer, Stationstraat 11, Castricum.
J. S. Mülschlegel, Rembrandt v. Rijnstra. 94, Groningen.
Dr. van der Plank, Zootenchnisch Inst., Billstr. 172, Utrecht.
R. Prakken, Bosweg 43, Wageningen.
D. Rempt, Gezondheidsdienst voor Dieren in Noord-Holland, Landbouwhuis, Alkmaar.
J. Richter, Spoorstraat 67, Boxmeer.
D. C. de Ridder, Raamweg 25/27, 's-Gravenhage.
W. J. Roepke, Loenenscheweg 80, Beekbergen.
K. A. A. Rouwenhorst, Prins Alexanderweg 58, Huis ter Heide.
H. W. J. Sannes, Holland Rading.
W. H. Schimmel, Amersfoortsestr. 35, Barneveld.
H. H. Scholten, Verspronkweg 3, Haarlem.
P. Sluis, Plumvee vee en Vogel, Voederfabrieken N. V. Weesperkarspel.
W. H. Smits, J. W. Frisostraat 6, Utrecht.
S. M. Speelman, Amsteldijk 152, Amsterdam Z.
H. Stehouwer, p/a N. V. Organon, Oss.
E. ten Cate, Wierdensestraat 51, Almelo.
J. G. Tukker, Utrechtscheweg 298, De Bilt.
P. Ubbels, Spelderholt, Beekbergen.
P. G. Vaags, Landstraat 45, Aalten.
A. J. Van Amerongen, C 189, Epe.
C. S. Th Van Gink, Joh. Vermeerstraat 3, Heemstede.
M. J. Verkuil, Bloemendaallaan 15, Barneveld.

G. de Vries, Jac v.d. Borchstraat 18, Utrecht.
E. Weekers, Hubertushof, Leemde.
P. J. Wijk, Pzn, Haersma de Withlaan 9, Apeldoorn.
D. J. Wiltink, Willemstraat 11, Doetinchem.
B. H. van de Zanden, Pieter Langendijkstr. 142, 's-Gravenhage.
H. v. d. Zee, p/a N.V. Organon, Oss.
F. A. Zeeuw, Soestdijkersweg 91, De Bilt.
D. M. Zuydam, Dordtsche Straatweg 981, Rotterdam-Z.
N. Zwiep, N.V. Philips-Roxane, Weesp.

INDIA

J. J. DeValois, Agricultural Institute, Katpadi, South India, Madras Presidency.
S. G. Iyer, Officer in Charge, Poultry Research Section, I.V.R.I., Izatnagar, U.P.
R. M. Patil, 27 Somwar Peth, Poona 2, Bombay State.
Raghunatha Reddy, Thambalappalle, Chittoor District, South India.
Mrs. M. N. Roy, The Roy's Pedigree Poultry Farm, P.O. Natra, 24 Pargs, West Bengal.

INDONESIA

A. Seno-Sastroamidjojo, Djalan Diponegord 62, Djakarta.

IRAN

Safa Imami, Polboland, Isfahan.

ISRAEL

Z. Ben-Adam, Govt. Poultry Exp. Station, Ako.
E. Einhorn, Poultry Farm, Meshek Ofot Ltd., Holon, Rasco.
Mrs. I. Gabriel, Ramot, Hashavim.
E. Jizchaki, 14 Menuha Venachla St. Rehovot.
A. Livshitz, P.O. Box 10, Tel-Aviv.
E. Moses, Ramot Hashavim, Post Ramatayim.
David Uri, Ministry of Agriculture, P.O. Box 11, Hakirja.

ITALY

Fratelli Babini, Russi, Ravenna.
Aurelio Carrante, Ministry of Agric., Rome.
Federico Clementi, Via Flamminia 43, Rome.
Nicola Faravelli, Soriasco, S. Mario della Versa, Pavia.
Avv. Ferdinando Garagnani, Assoc. Avicunicola Nazion, Via Gegatto 1, Bologna.
Allesandro Ghigi, Centro Avicolo di Bologna, Via San Giacomo 9, Bologna. (Honorary Life Member)
Renzo Giuliani, Ist. di Zootecnia, Universita, Firenza.
Comm. Gaetano Montefusco, Ministry of Agriculture, Via Sirte 55, Rome.
Alula Taibel, Staz, Sperimentale di Pollicoltura, Rovigo.
Nicola Tortorelli, Oville Nazionale, Foggia.
Anita Vecchi, Inst. di Zooculture, Universita, Bologna.
V. Vezzani, Instituto Zootecnico and Caesari per il Piemonte, Torino.
Carlo Zarotti, Via Calimala 2, Firenze.

JAPAN

Jirohiko Kondo, 75 Gochome, Asagaya, Suginami-ku, Tokyo. (Life Member).

JORDAN KINGDOM

M. K. Saca, Kilo 6 Street, Bethlehem.

LUXEMBOURG

Arthur Feller, Dudelange.

MALTA

Joseph Cesareo, 184 Pieta Wharf, Pieta.

NEW ZEALAND

E. Chambers, Wattledene, 187 Carmen Rd. Hornby, Christchurch.
J. H. Kissling, % The Library, Massey Agr. College, Palmerston North.

G. T. Mitchell, Gray Ave., Mangere East, Auckland.
K. C. H. Nogat, Grey Ave., Papatoetoe, Auckland.
Miss M. W. Stewart, P.O. Box 109, Tauranga.
Supt. of Poultry Industry, Dept. of Agric., Wellington.

NORTHERN IRELAND

The Agr. Research Inst., Mr. R. W. Hale, Sec., Hillsborough.
Fred R. Best, Lurgan Boxmaking Co., Ltd., Boxmore Lodge, Lurgan.
Miss A. E. Boyd, Ministry of Agric., Stormont, Belfast.
Miss M. H. Davidson, % Miss Gibb, Dublin Rd., Omagh, County Tyrone.
Miss A. G. English, 6 Vicars Hill, Armagh.
Mrs. D. C. Gamble, Derrygalley House, Dungannon.
R. F. R. Glanville, Hillview, Grahamsbridge, Dundonald, Belfast.
T. J. Kennedy, Millisle, County Down
David Luke, The Farm, Stormont, Belfast.
Mrs. E. Nelson, Lismoyle, Fivemiletown, County Tyrone
J. G. Rhynehart, Ministry of Agriculture, Stormont, Belfast.
Miss M. J. Sheedy, Govt. of N. Ireland, Minister of Agriculture, Stormont, Belfast.
R. F. Thompson, 76 Victoria Gardens, Belast.
Miss R. G. Walker, Manor Farm, Hillhall, Lisburn, Co. Antrim.

NORWAY

T. Anda, Sandnes.
G. J. Christensen, Hansteensgt 12, Oslo.
Leif Elstad, Seterstoa.
Kr. Grepstad, Skien.
Paul Grude, Kleppe.
Ivar Haraldseid, Vang 1, p., Hamar.
Johs Hoie, Norwegian H.S. for Agric., Vollebekk.
John Holland, Slagen, Tonsberg.
Jonas Jonassen, Mossige, Bryne.
F. Rostrup, Asker.
Kr. Soreide, Chr. Kroghsgt 30, Oslo.
Leif Svendsen, Norsk Fjorfeavlslag, Tollbugaten 12, Oslo.
Sverre Thingulstad, As.
Olaf Troeng, Vang l.p., Hamar.

PAKISTAN

Mrs. K. Ansari, 283 D'Cruz Rd., Karachi.
Ahmad A. R. Ghani, % S. A. Haq, 267 Eagle Road, Karachi.
Fasihudin Halim, 712/9 Outram Road, Karachi.
S. A. Haq, 267 Eagle Road, Karachi.
Mrs. Sagheer Hasan, 966, India Flour Mills, Garden West, Karachi.
Ziaul Hasan, % Jan Mohammad, Esqr.. P.O. Box 913, Dunolly Rd., Karachi.
Mrs. Z. Ilmuddin, Firdous-Afroz, Islamabad, Karachi.
Nural Islam, Esquire. 49, Intelligence School, Queens Road, Karachi.
Mohd. Hashim Ali Khan, 620 Black (8) Barrack (4), Pir Ilahi Bux Colony No. 2, Karachi 5.
A. F. Mir, M. Sc., Jhudo, Sind.
Jan Mohammad Esqr., Prop: Pakistan Boarding House, P.O. Box 913, Karachi.
Rusi K. N. Ptel, Karachi.
Sattar Quraishi, 1 Mary Road, Karachi.
Yusaf Rafi, 22 Bardi Bldg., McLeod Rd., Karachi.

PHILIPPINE ISLANDS

F. M. Fronda, Dept. of Poultry Husbandry, Univ. of Philippines, Laguna.

REPUBLICA DOMINICANA

J. Pulgar, Granja Avicola, San Cristobal, P.T.

SCOTLAND

Miss E. S. P. Adam, 32 Craigleith Cresc., Edinburgh 4.

Miss E. J. Anderson, Dept. of Agr. for Scotland, 41½ Union St., Aberdeen.
William Auld, Southfield Poultry Farm, Mauchline.
W. Bolton, Poultry Research Centre, King's Bldg., West Mains Rd., Edinburgh 9.
Miss M. C. Cameron, The British Oil & Cake Mills, 211 Union St., Aberdeen.
J. H. Carmichael, Thomas Howden Ltd., Carigentinny Ave. N., Leith, Edinburgh 6.
K. J. Carpenter, Rowett Research Institute, Buckshorn, Aberdeenshire.
A. C. Coutts, 22 East Preston St., Edinburgh.
Miss E. I. Coutts, Rose Villa, Alford, Aberdeenshire.
Mrs. E. Dalziel, Courthill, Auldgirth, Dumfrieshire.
Miss M. H. Deans, Department of Agric., 23 Blythswood Square, Glasgow C2.
J. Duckworth, Rowett Research Institute, Buckshorn, Aberdeenshire.
Miss E. M. W. Duff, Agricultural College Office, 2 Culbard St., Elgin.
Miss C. M. Dunn, Agricultural College Office, 41½ Union St., Aberdeen.
A. Edmondson, The British Oil & Cake Mills, Ltd., 19 Blythswood Square, Glasgow C2.
Miss B. L. Flint, % Scottish Agr. Ind. Ltd., 4 Park Gardens, Glasgow C3.
A. W. Greenwood, Inst. of Animal Genetics, Univ. of Edinburgh, W. Mains Rd., Edinburgh.
A. M. Holm, Hazelden Poultry Farm, Hazelden Mains, Newton Mearns, Renfrewshire.
J. C. D. Hutchinson, Poultry Res. Cen. King's Bldg., West Mains Road, Edinburgh.
Miss E. L. Ireland, 4 Albert St., Arbroath.
Stanley Kaye, Headinch Farm, Dinnet, Aberdeenshire.
Miss Susan Kirk, Deanery Bldgs., Dornoch, Sutherlandshire.
Miss M. D. Langlands, N. Scotland Coll. of Agr., 3 Union St., Inverness.
Miss G. Lewis, Edinbgh. & E. Scotland Col. of Agr. Old Academy Bldgs., Rose Terrace, Perth.
Miss M. M. MacLeod, Dept. of Agr. for Scotland, Livestock Improvement Branch St. Andrew's House Annexe, Edinburgh 1.
Mrs. A. G. Maxwell, Golfhill, Moffat, Dunfrieshire.
Miss M. M. McLean, 5 Duke St., Edinburgh 1.
Miss M. S. Miller, Dept. of Agriculture, 40 Tay St., Perth.
W. S. Miller, Poultry Research Centre, King's Bldgs., West Mains Rd., Edinburgh 9.
Miss E. M. Mills, Scottish Agr. Ind. Ltd., 199 High St., Ayr.
T. Milne, Kellas Poultry Farm, Kingennie, Angus.
J. G. Norman, Petmathen, Oyne, Aberdeenshire.
Miss D. J. Peace, Poultry Research Centre, West Main's Road, Edinburgh.
A. H. Sykes, Poultry Res. Cen. King's Bldg., West Mains Road, Edinburgh.
Sir Edward Villiers, Easter Hatchery, Ross-shire.
Chalmers R. Watson, Fenton Barns, Drem.
David M. St. C. Weir, 7/9 Arthur St., Leith, Edinburgh 6.
Donald S. Weir, 7/9 Arthur St., Leith, Edinburgh 6.
T. E. Whittle, West of Scotland Agricultural College, Auchincruive, Ayr.
James E. Wilson, Poultry Laboratory, Eskgrove, Lasswade, Midlothian.
Miss M. B. F. Wilson, British Oil & Cake Mills Ltd., Seafield, Leith.
D. P. Wright, Bass Rock Poultry Farm, North Berwick, East Lothian.

SIAM

Luang Suwan, College of Agr., Bangkhen, Bangkok.

SOUTH AFRICA

A. J. Benning, Div. of Economics & Markets, P.O. Box 460, Cape Town.
S. G. Birch, P.O. Box 472, East London, Cape Province.
W. F. Brunner, P.O. Box 177, Springs, Transvaal.
H. L. Delport, Agr. Research Institute, University of Pretoria, Pretoria.
A. M. M. Gericke, Agric. Research Institute, The University, Pretoria.
R. Heimann, Linsmore Ave. off Tokai Rd., P.O. Retreat, Cape Province.
George Hibbert, Athlone Farm, P.O. Box 41, Berglvei, Transvaal.
D. Jacobs, P.O. Box 10, Kroonstad, Orange, Free State.
A. J. Lind, Spero, Selous Rd. Claremont, Cape Province.
A. Robinson, 8 Robinson Place, Tollgate, Durban, Natal.
H. T. Slatter, P.O. Box 1606, Durban, Natal.
A. J. R. Stevens, 34 Ben Alder Rd., The Hill, Johannesburg.
P. D. du Toit, Iona Rd., Belleville, Cape Province.
A. Wessels, P.O. Box 598, Bloemfontein, Orange Free State.

SOUTHERN RHODESIA

G. Holbrook-Pitts, "Beacon House, P.O. Hatfield.

SPAIN

Luis Abad, Paseo de la Mina, Reus-Tarragona.
D. M. Aguera, Calle Doce de Octubre 4, Cordoba.
P. Y. Aleu, Fuente 6, Reus.
S. D. Alonsa, Germanias 34, Gandia, Valencia.
F. Blanco, Ciudad-Jardin, Villa Pura, La Coruna.
M. C. Burguete, Granja-Hotel Depiedra, Las Rozas, Madrid.
R. Calleja, Romero Robledo 4, Madrid.
J. C. Cano, General Mola 21, Zaragoza.
Federico Castello, Real Escuela de Avicultura, Arenys de Mar.
J. del Castillo, Explotacion Agricola Santa, Matilde, Apartado 5, Utrera, (Seville).
E. C. Cortes, Av. Jose Antonio 661-2, Barcelona.
T. De Allende, Jr., Castello 55, Madrid.
R. F. de Diego, Enrique de la Cuadra 8, Utrera (Sevilla).
J. G. Garcia, Av. Portugal 14, Tuy-Pontevedra.
J. M. Godall, Plaza de Tetuan 13, Barcelona.
Francisco P. Jover, Paseo De Soto, num 12, Alicante.
L. Latorre, Facultad de Veterinaria, Cordoba.
D. R. Orozco, Goya 83, Madrid.
I. Pena, Granja Avicola el Campillo, Rodrigo Caro 3, Utrera (Sevilla).
J. G. Piedrafita, Veterinario Municipal, Especialifads en Avicultura, Carcastillo, Navarra.
A. Romagosa, Av. Generalisimo 95, Tarragona.
V. S. Santiago, Granja Los Arcangeles, Alcala de Henares, Madrid.
M. Tosar, Adriano 15, Sevilla.
J. C. Verges, Centro 18, Barcelona.
J. M. Verges, 39 San Elias St., Reus.

STRAITS-SETTLEMENT

E. B. Chase-Currier, 1 Loring M., Off Still Road, Singapore.

SWEDEN

Verner Adelberth, Idrottsgatan 7B, Kristianstad.
Emil Ander, Harsback.
A. Andersson, Gunnarods Avelshonseri, Gunnarod, Billinge.
J. Andersson, Arnas, Askloster.
S. G. E. af Ekenstam, Svenska Smorprovningarna, Goteborg.
Olof Ekermann, Bandhagsvagen 24, Stureby.
S. Eliaeson, Kungstgatan 67A, % Svenska Agghandelsforb., Stockholm.
B. Flygare, Svenska Agghandelsforb, Kungsgatan 67, Stockholm.
Ivar Fors, Harald Fors & Co., Aktiebolag, Box 471, Stockholm C.

C. E. Gunnar, Lycketorps Honseri, Mjolby.
Einar Haeggblom, Karemo.
Ivar Hansson, Bjorkenas, Honseri, Kalmar.
G. Hermansson, Gunninge Honseri, Smygehamn.
E. Hultin, AB Ewos, Sodertalje.
Axel Isaksson, S. V. A., Stockholm 50.
Olaf Jaeger, Konsulent Swedish Poult. Ass'n., Vasagatan 5, Stockholm.
G. B. Karlsson, Adelsasens Honsgard, Stora Levene.
H. Karlsson, Box 424, Vara.
Gosta Kock, Eslov.
Gunnar Larsson, Malsjo Honsgard, Ostra Malsjo.
Sigfrid Larsson, Svalov.
Knut Littorin, St. Hov.
K. Lovgren, Hallingstorps gard, Borensberg.
Edw. Olsson, Edo Honseri, Box 550, Upplands Vasby.
Nils Olsson, The Agricultural University, Uppsala.
Oscar Pettersson, Fredricksal, Box 18.
A. Pettersson-Dahl, Ricksdagen II kammaren, Stockholm.
Gustav Roos, Sveafoder, Orebro.
Y. Rosengren, Billeberga.
C. Ake Roslund, Hova.
O. Sterner, Overlida.
Svenska Agghandelsforbundet, Forening, u.p.a., Kungsgatan 67A, Stockholm.
C. Tessman, Tess Farm, Svarvarbole.
G. B. Thorden, Uddevalla.
Sune Traskman, Sveriges Fjaderfaavelsforening, Vasagatan 5, Stockholm.
Vara Kontrollhonseri, (F. Malmros), Vara.
S. Verntofdt, Klagstorp.
Frederick Wehtje, Trolmens Egendom, Blomberg.
A. Wennerberg, % A. B. Kontrollfoder, Gothenburg 2.

SWITZERLAND

Adolf Achermann, "flora," Rothenburg/Lu.
Adroka, Ltd., Nauenstrasse 63, Basle.
Emil Bachofen, Haslen Hinter Egg, Zurich.
W. A. Bachofen, Dornacherstrasse 131, Basel.
Leo Bolter, Birkenau, Buchs, St. G.
H. Christ, Riethofstrasse 23, Glattburg (Zurich).
H. Dreyer, Werdtweg 5a, Bern.
Ernst Duttlinger, Ing. Agr. Klaisberg, Neftenbach.
H. Ebbell, Ovomaltine Eierfarm, Oberwangen (bei Bern).
H. Engler, Schweiz Geflügelzuchtschule, Zollikofen, Bern.
G. Flory, 12 Veux Clos, Conches (Geneva).
Hermann Gebauer, Ottikon/Gossau, Kt. Zurich.
Rene Grosjean, S.A., Oeufs en gros, Ave. de France 20, Lausanne.
Hans Günthardt, Grut. Adliswil, Zurich.
K. Haag, Dip. Ing. Agr., Rathausstrasse, Weinfelden.
E. Haefeli, Geflügelfarm Dickloo, Oberglatt (Zurich).
Paul Hagemann, St. Jacobsstrasse 191, Basel.
E. Hess, Instit. der Univer. Zurich, Breitingerstrasse 27, Zurich 2.
K. Huni, Arvenweg 8, Spiegel (Berne).
Institut fur Haustierernahrung, Universitatsstrasse 2, Zurich.
John Kappeler-Gutknecht, Reservoirstrasse 205, Basle.
A. Kiener, Laupenstrasse 25, Bern.
Karl Kleb, Kusnacht, Zurich.
S. Kulling, Ried, Thun.
Mrs. K. Kunath-Schinkel, Katharinehof, Aarau.
J. Lieblich & Co., Eier en gros, Solothurnerstrasse 50, Basel.
H. Loertscher, Institut fuer Tierzucht, Eidy. Technische Hochschule, Zurich.
Arthur Lüchinger, Dornacherstrasse 34-36, Basle.
E. Meisser, Schloss Binningen, Binningen(Baselland).
E. Mettler, Seg Bern, Konsumstrasse, Bern.

E. Millioud, Les Riedes, St. Blaise, Neuchatel.
E. Mossiman, Prasident des SGV, Riehen, Basel.
W. Müller, Schweiz Geflügelzuchtschule, Zollinkofen (Bern).
Albert Naef, Gutsverwalter, Bock ob Horgen, Zurich.
J. Nicod, Le Couvent, Granges, Vaud.
Dr. Per Rignes, % F. Hoffman-LaRoche & Co., A. G. Grenzacherstrasse 124, Basel.
Peter von Salis, Kreuzlingen.
E. Saxer, Welherstrasse 10, Gumlingen (Bern).
G. Schmid, Veterinabakt. und parasit, Institut der Universitat, Bern.
C. Schnorf, Bergestrasse 4, Zurich 27, Postfach.
H. Sequin, Coppet, Near Geneva.
P. Siegenthaler, Hammermuhle, A. G., Olten.
J. Ph. Stoeskli, Sion.
Max Sulser, Seg-Zurich, Glattbrugg, Zurich.
Werner Thomann, Schweiz, Geflügelzuchtschule, Zollikofen-Bern.
L. Valko, Rothrist.
A. Walder, Waldeck, Walchwil am Zugersee.
P. Willi, Muhle Dubendorf, A.G., Dubendorf (Zurich).

TURKEY

K. Bilgemre, Animal Breed. Inst. Agric. College, Ankara.
H. S. Oytun, Institute of Parasitology, Veterinary Faculty, Ankara.

UNITED STATES OF AMERICA

O. J. Abbott, Box 2922, Univ. St., Lexington, Ky.
M. Abelman, % Puritan Mills, Box 4004, Atlanta, Ga.
R. E. Ahlin, Doughboy Industries, Inc., 215 North Main Ave., New Richmond, Wis.
Byron Alder, Dept. of Poultry Husbandry, Utah State Agr. College, Logan, Utah.
W. H. Allen, Sec. of Agriculture, 1 West State St., Trenton, N.J.
H. H. Alp, Director Pltry. Dept. American Farm Bureau Fed., 221 No. LaSalle, Chicago, Ill.
S. L. Althouse, Watt Publishing Co., Mount Morris, Ill.
A. S. Anderson Hatchery & Breeding Farm, Rt. 2, Box 325, Rio Linda, Calif.
V. S. Asmundson, Div. of Poultry Husbandry, University of California, Davis, Calif.
Harry Atkins, Sec., American Poultry Assoc., Box 756, Davenport, Iowa.
J. M. Atkinson, Box 97, Nevada, Mo.
C. D. Ator, 836 N.W. 50th, Oklahoma City, Okla.
T. B. Avery, Dept. of Poultry Husbandry, Kansas State College, Manhattan, Kansas.
M. C. Babcock, Babcock Poultry Farm Inc., RD 3, Ithaca, N.Y.
M. M. Bacharach, University of Wisconsin, Dept. of Poultry Husbandry, Madison, Wisc.
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W. J. Barga, 108 West Wood St., Versailles, O.
E. Z. Beanblossom, 310 Crescent Dr., Bryan, Texas.
W. A. Berger, Amer. Feed Mfgrs. Assn., 53 West Jackson Blvd., Chicago 4, Ill.
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C. C. Blake, State Dept. of Agriculture, Charleston, West Va.
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J. Borger, Chas Zucker Co., 57-61 West 38th St., New York 18, N.Y.
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R. V. Boucher, 303 Frear Lab., State College, Pa.
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C. S. Brewster, 112 S.E. Clay St., Portland 14, Oregon.

George M. Briggs, Poultry Nutrition Unit, National Institute of Health, Bethesda 14, Md.
A. R. Broman, P.O. Box 1141, Great Falls, Montana.
Ambrose Brownell, Brownell Farms, Box 73, Milwaukee 2, Oregon.
J. H. Bruckner, Rice Hall, Cornell University, Ithaca, N.Y.
O. Brunken, 440 W. Walnut St., Pasadena 3, Calif.
D. J. Bryant, 266 Brisbane St., Monrovia, Calif.
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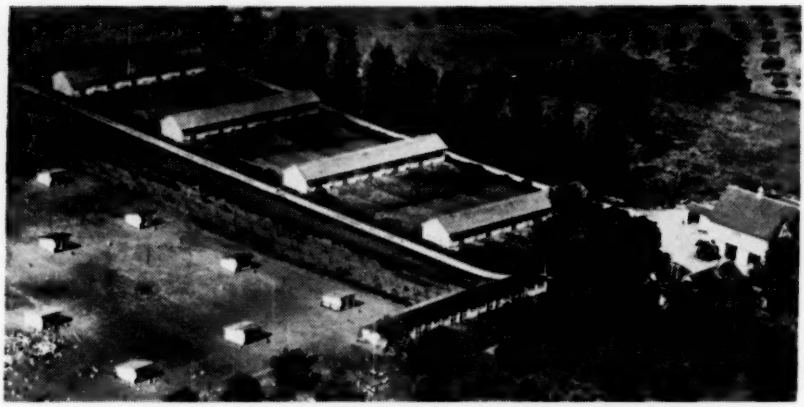

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PROTECTION. Sulfaquinoxaline helps birds to develop an immunity to the types of coccidia to which they are exposed.

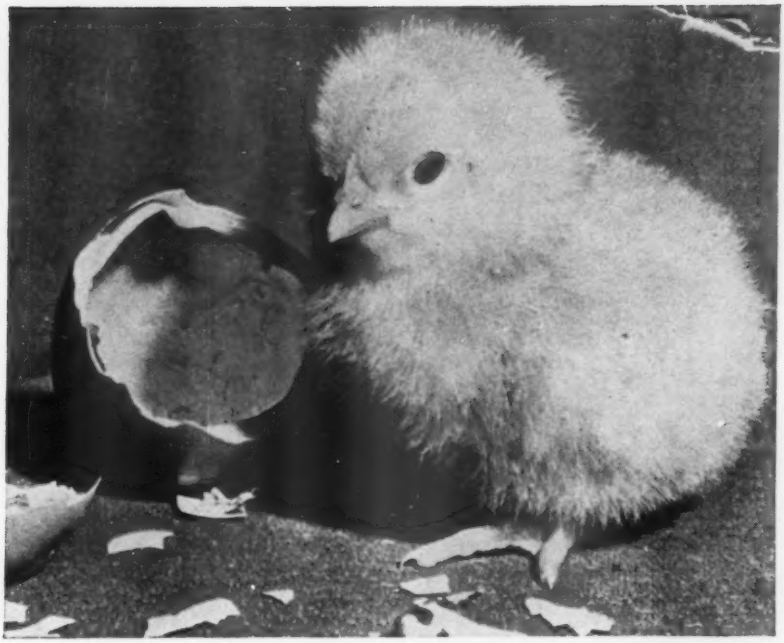
Numerous published *reports by outstanding poultry authorities* attest to the effectiveness of Sulfaquinoxaline. Annotated bibliography and detailed literature on the use of Sulfaquinoxaline in feed or drinking water will be sent on request.

Sulfaquinoxaline products are supplied, under the labels of various manufacturers, in the form of feed mixtures, premixes, solutions, tablets, or soluble powder.

SULFAQUINOXALINE MERCK

MERCK & CO., Inc.
Manufacturing Chemists
RAHWAY, NEW JERSEY
In Canada: MERCK & CO. Limited—Montreal

MERCK



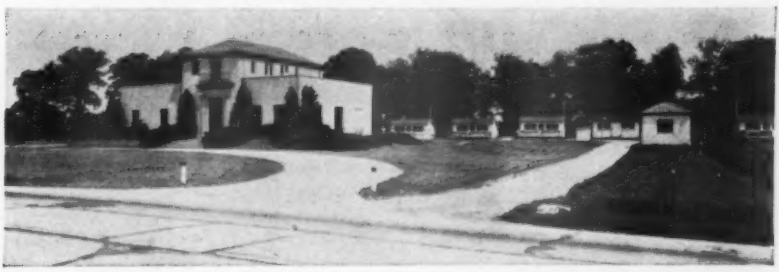
THE CHICK SEASON LASTS ALL YEAR AT BORDEN'S EXPERIMENTAL FARM

Incubation never stops at Borden's Experimental Laboratory and Farm at Elgin, Illinois. Each year thousands of baby chicks emerge from their shells to take important roles in Borden's poultry nutrition research and in the quality-control of Borden's Feed Supplements.

Borden is continually "asking the chicken" for the answers to more efficient and more economical nutrition.

The Borden Company

Feed Supplements Department, 350 Madison Avenue, New York 17, N. Y.



"BASIC PRODUCERS" *of* NUTRITIONAL PRODUCTS *from the* SEA . . . .

"Basic Producers" of vitamin concentrates — not just blenders or mixers — that's the important thing to remember about Whitmoyer Laboratories, Inc.

Extensive, modern Whitmoyer marine products processing plants strategically located along the Atlantic Coast—in New England and in Nova Scotia—produce thousands of tons of meals and oils. From these basic raw materials—rich in natural vitamins and valuable marine proteins—are developed, through our own nutritional experiments and practical farm use, products which are scientifically sound and economically practical.

WHITCOD, our pure cod liver oil, fortified to any required potency, has long been recognized for its uniformly high quality and reliability.

*CLO-MEAL and FLAV-A-DEE, dry vitamin concentrates made from a cod liver meal base, have been used with outstanding results in hatchability and production.

TRA-MIN, the original patented trace mineral compound with its famous stabilized marine "protein-bound" iodine content has proven to be the ideal way to incorporate the essential trace elements with a single product.

For more complete information on these and other Whitmoyer products—including the Whitmoyer line of Poultry and Livestock Health Products—write us today.

*CLO-MEAL and FLAV-A-DEE, as well as other Whitmoyer vitamin concentrates, are natural sources of Vitamin B_{12}. When these products are used at our recommended levels, supplemental amounts of B_{12} are not required.

Whitmoyer LABORATORIES INC

Manufacturing Chemists

MYERSTOWN, PENNA., U.S.A.

Branch Plant
ROCKLAND, MAINE

In Canada
WHITMOYER LABORATORIES, LTD.,
YARMOUTH, N.S.

Announcing

DUOFERM

OUTSTANDING NEW ANTIBIOTIC FEED AND VITAMIN B_{12} SUPPLEMENT

contains: **5 grams bacitracin per pound and 1.5 milligrams vitamin B_{12} activity per pound**

Maximum Flexibility. Here is an outstanding combination of antibiotic and vitamin B_{12} activity developed by Commercial Solvents Corporation to allow maximum flexibility in the manufacturing of feeds for poultry and non-ruminants. Duoferm is a natural product obtained by pure culture fermentation.

Guaranteed Potency. Duoferm is guaranteed to contain not less than 5 grams of bacitracin and not less than 1.5 milligrams of vitamin B_{12} activity per pound.

Greater Weight Gains – Increased Feed Efficiency. Duoferm stimulates growth, reduces mortality, increases feed efficiency and produces birds of better market grade. Tests with 600 New Hampshire mixed-sex chicks showed a 6.65% increase over normal growth, 11.9% improvement in feed efficiency, and a 7.7% reduction in mortality.

Just 2 Pounds *Duoferm* per Ton of Feed. Suggested feeding level is about 2 pounds per ton of finished feed. This adds 10 grams of bacitracin and 3 milligrams of vitamin B_{12} activity per ton of feed. For rations containing low levels of fish products, Duoferm is a most effective and economical combination.

Easy to Use. Duoferm is dry, free-flowing, stable and easy to mix. Color is good and odor pleasant. It won't cake or dust. Compatible with all coccidiosis control ingredients. Easy to handle—packed in 50-pound bags.

Available Year-Round. Duoferm is a primary product produced year-round at Peoria, Illinois. Ample tonnage for your requirements at all times.

CSC

COMMERCIAL SOLVENTS CORPORATION